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FINAL:

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ENVIRONMENTAL IMPACT STATEMENT ON  
THE PROPOSED MONTANA POWER COMPANY  
ELECTRICAL GENERATING PLANT AT  
COLSTRIP, MONTANA

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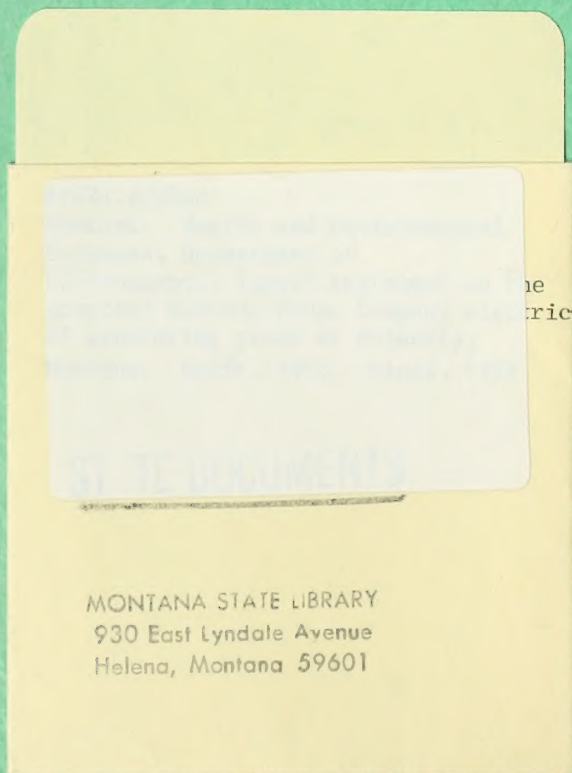
March, 1973

Department of Health and Environmental Sciences  
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## FORWARD

This final environmental impact statement is submitted pursuant to the Montana Environmental Policy Act, (MEPA), Section 69-6504 (b)(3). The statement was prepared by the Environmental Sciences Division of the Montana State Department of Health and Environmental Sciences, regarding a coal-fired electric generating plant proposed for construction near Colstrip, Montana, for which an application has been received for a permit to construct.

Although MEPA requires this agency to assess all foreseeable impacts that might result from construction of the proposed plant, issuance of the requested permit is contingent only upon adequate demonstration by the applicant of the ability to prevent illegal air pollution. To date, research by the State and the applicant has not indicated that illegal air pollution would result.

Under MEPA, agencies and individuals have 30 days to comment following publication of a final environmental impact statement. If, within that time, no credible evidence of illegal pollution is received, the permit will be issued as requested.

Comments should be submitted to the Air Quality Bureau, Montana State Department of Health and Environmental Sciences, Cogswell Building, Helena, Montana, by April 20, 1973.



## SUMMARY: FINAL ENVIRONMENTAL IMPACT STATEMENT

Coal-Fired Steam Electric Plant, Colstrip, Montana

Prepared by Montana State Department of Health and Environmental Sciences  
Environmental Sciences Division

### 1. TYPE OF ACTION: Administrative

### 2. DESCRIPTION OF ACTION:

The Montana Power Company and the Puget Sound Power and Light Company have made application for a Construction Permit to the Montana State Department of Health and Environmental Sciences, Environmental Sciences Division, for a 700-megawatt coal-fired steam electric power generating plant to be located just east of Colstrip, Montana. The first unit is scheduled for completion in 1975 and the second in 1976. The Montana Environmental Policy Act required that an impact statement be submitted and evaluated prior to any major action, in this case the granting of a Permit to Construct.

The generating station will burn coal from an adjacent mine. The coal will be transported by truck from the mine to a crusher and from there to the plant by conveyor. Cooling water, boiler make-up water, and scrubber water will be transported by pipeline from the Yellowstone River, about 31 miles to the North. There will be no return to the river.

The companies propose to construct two additional transmission lines from Colstrip to the Billings area.

### 3. PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

Sulfur oxides, particulate, nitrogen oxides, trace elements, water vapor and heat will exhaust from two 500-foot stacks. Emission and ambient air levels probably will comply with all state and federal standards. Effects of pollutants, including fluorides, on flora and fauna, weather, and aesthetics appear minimal, although subtle long-term effects may be indeterminable.

Construction of the power plant, cooling systems, transmission lines, pipeline, and strip mine development impose primary and secondary impacts on the environment. These will affect flora and fauna, aesthetics, the economy, society and others.

### 4. PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED, SHOULD THE PROPOSAL BE IMPLEMENTED

Some of the adverse effects include the consumption of a non-renewable resource, air quality degradation, disturbance of land by mining, and aesthetic degradation.

### 5. ALTERNATIVES TO THE PROPOSED ACTION

The only alternative feasible within the time frame set for construction of the plants is a reduction in the rate of increase of the use of electrical energy.

### 6. SHORT TERM BENEFITS VS. LONG TERM EFFECTS

The long-term adverse effects may well outweigh the short term gains.



## 7. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF NATURAL RESOURCES

The proposed plant will consume 90 million tons of coal over the 30-year life of the plant, or three million tons per year of this non-renewable resource.

## 8. RESPONSE TO THE DRAFT STATEMENT

Over 3000 responses have been received commenting directly or indirectly on the draft statement, mostly in opposition to the construction.



## SUMMARY OF STATISTICS OF COLSTRIP PLANT

<u>Location</u>	One mile east of Colstrip, Montana, 30 miles south of I-94, at Forsyth; Section 34, Township 2 North, Range 41 East, Rosebud County, Montana
<u>Elevation</u>	3200 feet above sea level
<u>Ownership</u>	The Montana Power Company and Puget Sound Power and Light Company
<u>Operation</u>	Montana Power Company
<u>Scheduled Completion</u>	Unit #1, July, 1975; Unit #2, July, 1976
<u>Total Cost</u>	\$183,000,000
<u>Steam Generator</u>	Combustion Engineering Company
Capacity	2,520,000 lb steam/hr/unit
Size	206 feet high, 160 feet wide, 238 feet long
<u>Turbines</u>	General Electric
Capacity	350 mw/unit, 700 mw total (nominal)
<u>Cooling Towers</u>	Ecodyne Corporation Wet crossflow induced draft type 65 feet high, 48 feet wide, 252 feet long; 117,200 gal/min inlet water/unit
<u>Stack</u>	Two stacks--each 500 feet high, approximately 30 feet diameter at base
<u>Scrubbers</u>	
Type	Venturi with alkali chemical system
Capacity	1,600,000 cu. ft. per min. @ 293°F
<u>Buildings</u>	300 feet high, 160 feet wide, 238 feet long
<u>Coal</u>	385,000 #/hr; 8,843 BTU/#, 23.87% moisture, 0.77% sulfur, 8.59% ash
<u>Mine</u>	Strip-type, approximately 65 surface acres/year, 3,000,000 tons of coal/year
<u>Transmission Lines</u>	3 lines, 230 kv each, 60 feet high, 800 feet average span, 3 conductors, 2 shield wires per line
<u>Pipeline</u>	22" to 26" diameter, (minimum), approximately 30 miles
<u>Water Consumption</u>	8,000 gals per minute, $4.2 \times 10^9$ gal per year
<u>Settling Ponds</u>	30 surface acres, 100 acre feet



I. DESCRIPTION OF PROPOSED ACTION



## I. DESCRIPTION OF PROPOSED ACTION

### Plant and Process

The Montana Power Company (MPC) and the Puget Sound Power and Light Company propose to construct a 700 megawatt electrical generating station near Colstrip, Montana. This complex of two 350 mw units would provide electricity for Montana users and for delivery to the Northwest Power Pool, of which the two companies are members. The plant would burn coal, supplied from deposits in the immediate area of Colstrip. The first unit is scheduled for completion by July, 1975, and the second by July, 1976.

The proposed plant would be the third coal-fired steam electric generating facility and the first "mine-mouth" plant to be constructed in Montana. Montana Dakota Utilities' 44 mw plant at Sidney (1958) and Montana Power's 180 mw Corette plant at Billings (1968) are small by comparison. The applicant (MPC) states that economic, technical and environmental considerations favor locating the plant at Colstrip rather than nearer the load centers. Mine-mouth generation is not always favored, as demonstrated by the large amount of Montana low sulfur coal now being contracted to power plants old and new in the midwest.

In the case of the proposed Colstrip plant, the applicant states that the mine-mouth facility is favored in part because no new transmission lines will be required west of Billings. One line currently is under construction to carry electricity from Billings to the plant until generation begins. The power flow would then be reversed, with electricity produced at Colstrip flowing to Billings.

Two additional lines are in the planning stage. No routes have been selected, the applicant states, although corridors have been selected, as illustrated in the section on impacts.

The alternative of hauling coal to a plant nearer the load centers would leave the applicant open to disruptions from labor disputes, increased costs from increasing railroad rates, and other continuing costs. By contrast, a power line, once built, has relatively little maintenance cost.

Environmentally, the Colstrip area was favored for the project because it

"is remote and the development would affect few people directly . ."

according to the applicant. Further, the applicant asserts,

"the weather patterns of eastern Montana are generally less confining than the more mountainous terrain of much of MPC's service area."

Continuing in the words of the applicant:

"Existing land use levels would be upgraded by the proposed development; i.e., more people would realize more use from the energy available from this land than the values being received by very few people at its present level of use. Also, the land disturbed by the mining activity will be reclaimed, and the extensive research over the past 5 years in WECO's (Western Energy Company) area, indicates the disturbed land will be back in production in 3 to 5 years. The site adjacent to the town of Colstrip minimizes the travel and time of the operating personnel to and from work, as town facilities, including homes, would be provided by expanding the existing village."

A number of other possible sites within the MPC service area were investigated before Colstrip was selected. MPC data indicate two of the sites considered were Cushman, near Ryegate, and Springdale, between Livingston and Big Timber. Economic evaluation found Colstrip was favored on a cost basis by less than one percent. Nevertheless, Colstrip was chosen, for reasons previously mentioned.

Air pollution probably is the most serious environmental effect of coal-fired generating plants. Potential air pollution from the proposed plants would be controlled by venturi wet scrubbers. The scrubbers purchased for the Colstrip plant are designed to remove both SO<sub>2</sub> and particulate matter from the combustion gases. Although venturi scrubbers of various design have long demonstrated a high efficiency in removal of particulate matter larger than 2 micron, their long-term reliability for SO<sub>2</sub> removal still is questioned by the utility industry.

The EPA is convinced that wet scrubbers using lime slurry can effectively control SO<sub>2</sub>, and the EPA New Source Performance Standards were formulated on the assumption of their workability.

In justifying its new source standards, the EPA stated as follows:

"The administrator took into account the following facts in determining that there has been adequate demonstration of the achievability of the standard.

"There are at present three SO<sub>2</sub> removal systems in operation at U. S. power stations. Moreover, a total of thirteen electric power companies have contracted for the construction of seventeen additional units, most of which will become operational in the next two years."

The EPA then mentioned three units which have had adequate success in operation. The most successful of the three was a Bahco unit which had no serious operational difficulties between November, 1969, and March 21, 1972, when the EPA justified its standard in the Federal Register.

A number of venturi scrubbers have demonstrated effective removal of SO<sub>2</sub> over a relatively short trial period, but the degree of their efficiency over longer periods is in the test stage.

An article in the December, 1972, Engineering and Mining Journal assessed the state of the art of SO<sub>2</sub> removal as follows:

"It has been independently concluded by a number of investigators that the wet limestone scrubbing process is the closest to commercial availability of the many processes suggested to date. Under pressure from regulatory bodies, commitments have been made by the utilities industry to build large, commercial-prototype installations employing limestone scrubbing. However, despite extensive laboratory and pilot plant research to date, a more realistic view is that considerable development work remains to be done before the process can be considered 'proved.'"

Continuing, "A difficult and perhaps extended period of shakedown can be anticipated for the initial commercial units now being built or started up in the utility industry. And although these units are being installed in commercial systems, they must be regarded as development in nature."

A recent technical conference on the subject revealed a wide range of problems being experienced by operators of venturi scrubbers on power plants.<sup>10</sup> At the conclusion of the conference, the program chairman addressed the assembly as follows:

"Let me say that a lot of what you've heard today sounds pessimistic. You really wonder how these companies stand all of the pains they're going through. But thank God for those who are paying the price to lead us into this important technology.

"There were a lot of pessimistic reports on many of the pioneering nuclear plants in days past. There were continual embarrassments and cost and schedules were often way out. But go back and see how well those plants are running today and compare their capital costs with today's estimates. Those pioneers paid a price to lead us into nuclear technology, but in the end, many got a bargain."

"I had a couple of people tell me last night that they're scrambling now to get up to speed on sulfur-removal technology, and that they wish they already had a couple of years' experience in running a scrubber. So I hope there's some analogy here to the early nuclear experience. Gentlemen, I thank you. I'm sure the whole industry thanks you for leading the way."

Recent experience elsewhere indicates venturi scrubbers can be operated reliably and efficiently on large power plants. At the Dave Johnston plant near Casper, Wyoming, for example, gasses from a 320 MW unit have been scrubbed at an efficiency above 99 percent on particulate and about 50 percent on SO<sub>2</sub>.<sup>33</sup>

Although the plant does not fall under the EPA New Source Performance Standards, the owner, Pacific Power and Light, intends to spend \$30 million installing scrubbers on the other three stacks at the Casper plant, believing them to be more effective in pollution control than electrostatic precipitators.

The scrubbers for the proposed Colstrip plant would be substantially over-designed and operated in parallel with three venturis on each unit. Should one venturi malfunction or require maintenance, the boiler still could operate at 80 percent of full load, with the two operating venturis maintaining the design collection efficiency.

All assumptions made by the State regarding the potential for air pollution are contingent upon operation of the scrubbers at the efficiencies guaranteed to the applicant by the supplier; 99.5 percent on particulate, 39.7 percent SO<sub>2</sub> removal. Performance at these efficiencies would limit SO<sub>2</sub> emissions to 1.0 lb SO<sub>2</sub>/million BTU, and fly ash emission to .018 grains per actual cubic foot, at any operational load.

Should the scrubbers malfunction, the operating load of the plant would have to be reduced to whatever load could be handled by the remaining operable scrubbers. There is no bypass for combustion gas to escape around the scrubbers, and the plant will not be allowed to operate in violation of state and federal air pollution laws. Monitoring of ambient air and stack gasses will be performed as the need is seen.

The applicant will follow the requirements of the Environmental Protection Agency by installing in-stack continuous monitoring equipment for particulates, sulfur oxide, and nitrogen oxides. Test ports will be placed in the stack and breaching for source monitoring by the company and state and federal agencies.

The state is confident that the system ordered by the applicant for pollution control is as effective as any on the market today.

A study of venturi scrubbers on power plants performed for the EPA indicated a high efficiency on a variety of pollutants generated in coal combustion. Hydrogen fluoride, one of the most worrisome pollutants, was removed, along with other soluble gasses, at an efficiency averaging 90 percent. The lowest removal efficiency of the gasses was 70 percent, the highest 99.7.

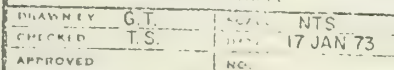
Tests at a pilot venturi scrubber operating at the J. E. Corette plant in Billings indicated an average fluoride removal above 90 percent. More specific data is included in the section on Emissions. A description of the scrubber operation follows later in this section.

Mechanical draft evaporative cooling towers will be used to cool the plant. There will be no discharge of heated water, except into the air as vapor.

The towers would be

"supplied by Ecodyne Cooling Products Company. The size and location have been shown in the construction permit application. Each plant unit will have one cooling tower of seven cells. The fans will be powered by 200 hp motors and will use 185.2 hp at rating. The towers are rated at an inlet wet bulb temperature of 60°F and will have a range of 31.7°F and an approach of 21.5°F when cooling 113,000 gpm of 113.2°F water. Actual condenser flow will be 104,000 gpm. Evaporative loss at rating will be 3.17% and guaranteed maximum drift will be 0.02%. Under these conditions, the water consumed by the towers will be 3,323 gpm at the required condenser flow."

The cooling towers will receive hot water from the plant condensers and return cool water to condense steam from the turbines. Blowdown from both the cooling towers and the boiler will be discharged to the ash pond. Pond water will be recirculated to the scrubbers in a closed loop system. Collected flyash from the scrubbers, bottom ash from the boilers, and economizer ash will be sluiced to the ash pond, and periodically removed for disposal in a manner not yet determined. Two ash ponds designed for decanting and draining would aid in the ash disposal. The ponds will be sealed with bentonite or plastic to prevent leaching.



## Pipeline and Water Supply

Plant water will be obtained from the Yellowstone River and supplied to the plant by a buried steel pipeline at least 22 inches in diameter. The pipeline will intercept the Yellowstone at one of three possible points illustrated in Fig. 1. It will carry 8,000 gallons of water per minute to a 100 acre-feet surge pond. The pond, covering approximately 30 surface acres, will hold a three-day supply of water for the plant.

## Transmission Lines

As previously noted, electricity would be transferred by three 230 KV transmission lines, originating in the plant switchyard and extending west to the Billings area. The line now under construction is routed south of the Yellowstone River Valley through Hardin to the J. E. Corette steam electric generating station in Billings. Two additional lines are scheduled for completion in mid-1975 and 1976. These two lines will share a common corridor where feasible, crossing the Yellowstone River Valley east of Billings at a location yet to be determined. They will terminate at a new substation to be added to the Montana Power Company's integrated system north of Billings. Each line will consist of three conductors and two shield wires supported by two vertical wooden poles with some three pole structures where required. The lines will be approximately 60 feet high with an average of 800 feet between poles.

The Billings substation will be the termination point of six 230 KV lines. Two of these, one from Anaconda and one from the Corette plant, are already operating. An additional line from the Billings plant would be put on the existing double circuit towers. Another of these lines will be the Billings-Great Falls line, construction of which will begin in 1973. The Colstrip lines would be the last two lines to terminate in the substation. No surveying has begun on the two Colstrip lines, according to the applicant. No right-of-way was procured as of January 31, 1973. In the words of the applicant,

"A July, 1973, completion of preliminary survey is necessary to allow sufficient time to evaluate environmental engineering, right-of-way, and material

considerations before construction which must commence in the spring of 1974."

Power lines and pipelines are further noted in the section on Impacts.

### Strip Mining and Coal Supply

Western Energy Corporation, a wholly owned subsidiary of Montana Power Company, will supply coal for the ~~generating~~ facility. Approximately 65 surface acres will be mined each year to supply the estimated consumption of three million tons of coal per year. Coal will be trucked from the mine pits to a crusher and taken by conveyor belt to the plant site stockpile. The Montana State Department of Lands will make intensive evaluations of the strip mining and reclamation necessary for this facility. Environmental impact statements will be written, as required by the Montana Environmental Policy Act of 1971. The Department of Lands also requires that permit applications be submitted and the mining will be closely regulated.

The vast quantities of strippable coal in eastern Montana and the Fort Union Region suggest further electrical energy development in the area. The North Central Power Study, funded and supported by the Bureau of Reclamation in collaboration with some 35 interested utilities, proposed development of up to 53,000 mw generating capacity in the Fort Union Region of southeastern Montana and northern Wyoming. The Montana Power Company and Puget Sound Power and Light Company are considering at least two additional 700 mw units at Colstrip.

### Construction and Location

The proposed plant will be located immediately east of the company town of Colstrip, about 30 miles south of Interstate 94 at Forsyth and about 90 cross-country miles due east of Billings. Montana Power Company owns and has available 1365 acres for the plant site. This area will contain the two thermal electric generators, cooling towers, surge pond, ash ponds, and a coal storage area.

Employment during construction will peak at 800-900 men. Following construction, approximately 44 persons will be required to operate Unit #1, and 19 more will be

required for Unit #2. An additional 55 employees will be needed in the mining operation. Operating personnel and mining employees probably will be housed in Colstrip. The Ken R. White Company of Denver, land-use planners and designers, has developed a town plan.

The total cost of the proposed facility will be in excess of \$183 million. The Bechtel Corporation, headquartered in San Francisco, is the engineer-contractor for the generating facility.

#### Detailed Description of Process

Figure 2 illustrates a material balance for the generating facility as submitted by the applicant.

Following is a more detailed process description also submitted by the applicant:

"Coal of approximately 1.5 inch lump size is transported to the plant storage site. It is mechanically conveyed into the plant and fed to coal pulverizers which reduce it in size from 1.5 inches to a size such that 70% of the coal will pass through a 200 mesh sieve. The pulverized coal is then used as combustion fuel for a steam generator. The coal is fed into the steam generator through fuel nozzles, which are located at the four corners of a furnace. The coal is mixed with air in the furnace and ignited. The combustion process gives off energy in the form of heat which is transferred through the furnace walls to water which is converted to steam at 2,400 lbs per sq. inch and 1,000°F. The steam is piped to a turbine which extracts energy by reducing the steam to a low pressure and temperature. The energy is used to rotate the shaft of an electric generator whose output is delivered to an electric transmission system exterior to the plant.

"The low pressure steam exhausted from the turbine is reconverted to water by cooling in a condenser, and then returned to the steam generator for reuse. The cooling is accomplished by supplying water at a lower temperature than the steam to the tube side of a shell and tube heat exchanger (condenser). The cooling water absorbs the heat of the condensing steam through the tube walls and is pumped to a cooling tower where it is exposed in the form of droplets to a flow of atmospheric air. The air evaporates some of the water causing the balance to be cooled so that it can be returned to the condenser for reuse. Fresh water to replace the amount that is evaporated is supplied to the cooling tower from the surge pond or pipeline.

"In the steam generator, the unused portions of the combustion air and the gaseous products of combustion are combined, and along with any suspended fly ash from the burned coal, are conveyed to a flue gas scrubbing system installed for emission control. This is a full stream scrubber system that will simultaneously remove fly ash and sulfur dioxide. The removal is accomplished by scrubbing the flue gas with an alkaline solution of water

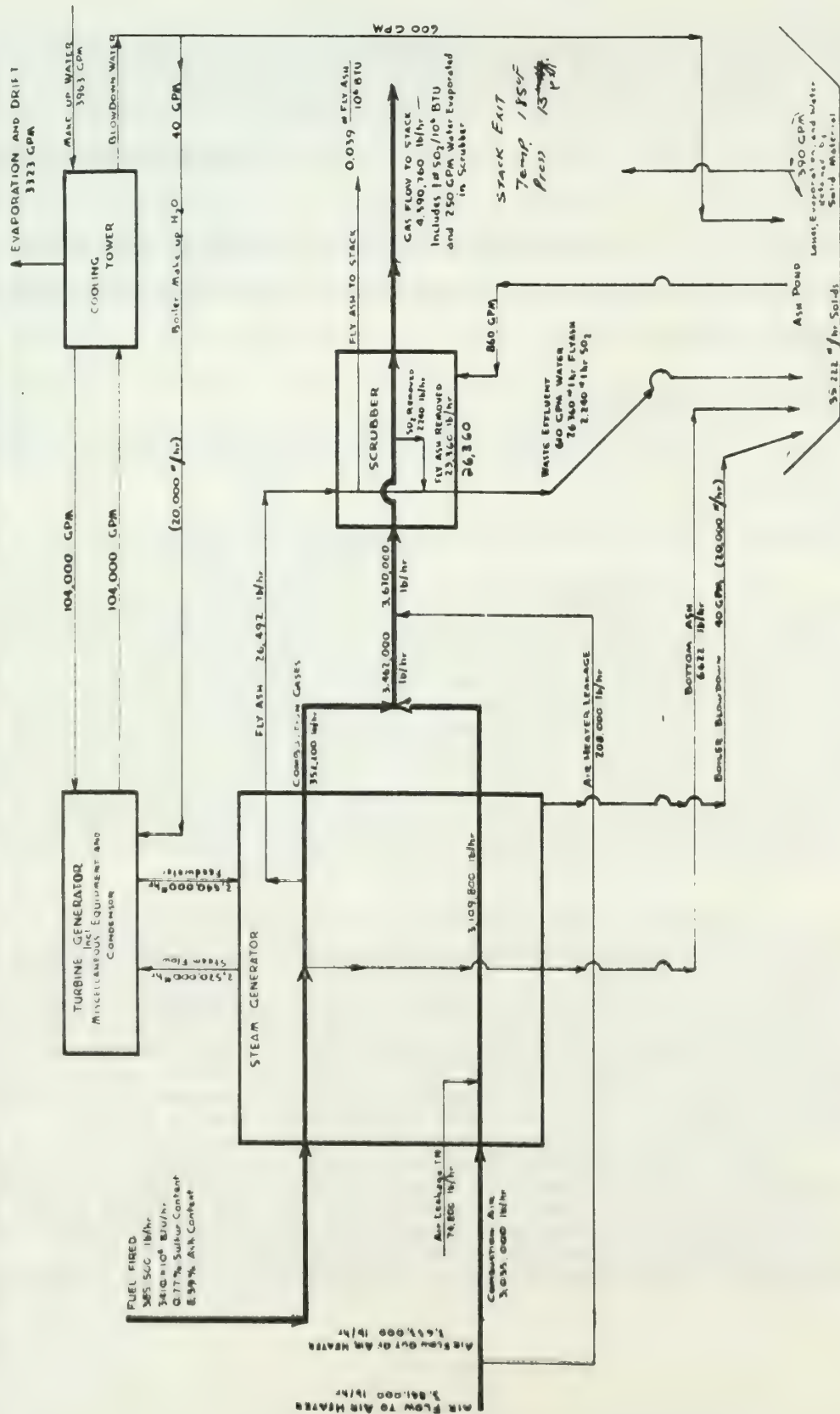


Figure 2

ITEM VII

Flow Diagram  
TYPICAL FOR EACH UNIT

and calcium carbonate, which is generally available from the fly ash. If the alkalinity of the ash varies to a point where additional alkalinity must be added, it is obtained by the addition of soda ash ( $\text{Na}_2\text{CO}_3$ ) or lime ( $\text{CaO}$ ). The gaseous sulfur dioxide will react with the calcium carbonate to form solid calcium or sodium salts. At the same time, the mechanical action of the scrubber traps fly ash particles in the water droplets. Recirculation within the scrubber system makes the alkalinity in the ash available for the process. The used scrubber solution, newly formed salts, and trapped fly ash are piped to an ash pond where the solids settle out. The pond water is then recirculated back to the scrubber in a closed loop system from which no water is discharged to any natural bodies. This emission control system is guaranteed to limit the sulfur oxide emissions to 1.0 lb  $\text{SO}_2$ /million BTU and the fly ash emissions to .018 grains per actual cubic foot, at any operational load of the power plant.

"The coal charged into the process will have the following average composition:

Moisture	23.87%
Fixed Carbon	38.95
Volatile Matter	28.59
Ash	<u>8.59</u>
	100.00%
Sulfur	0.77% (included above)
Heating Value	8,843 BTU/lb

At full load, 385,500 lbs per hour of this fuel will be burned in each unit corresponding to 3,410 million BTU per hour of heat release per unit. The corresponding sulfur oxide production would be 5,650 lbs per hour  $\text{SO}_2$  or 1,658 lbs  $\text{SO}_2$  per million BTU input. The flyash production would be 26,492 lbs per hour, since 20% of the total input of 33,114 lbs per hour will become attached to the furnace walls and removed as boiler slag while the balance leaves the furnace as fly ash. This corresponds to 7.77 lbs of fly ash per million BTU.

"The guarantees on the emission control systems are equivalent to 99.5% particulate removal and 39.7%  $\text{SO}_2$  removal, which will limit particulate emissions to 0.039 lbs per million BTU input and sulfur oxide emissions to 1.0 lbs per million BTU input."

Detailed information on the scrubber system follows:

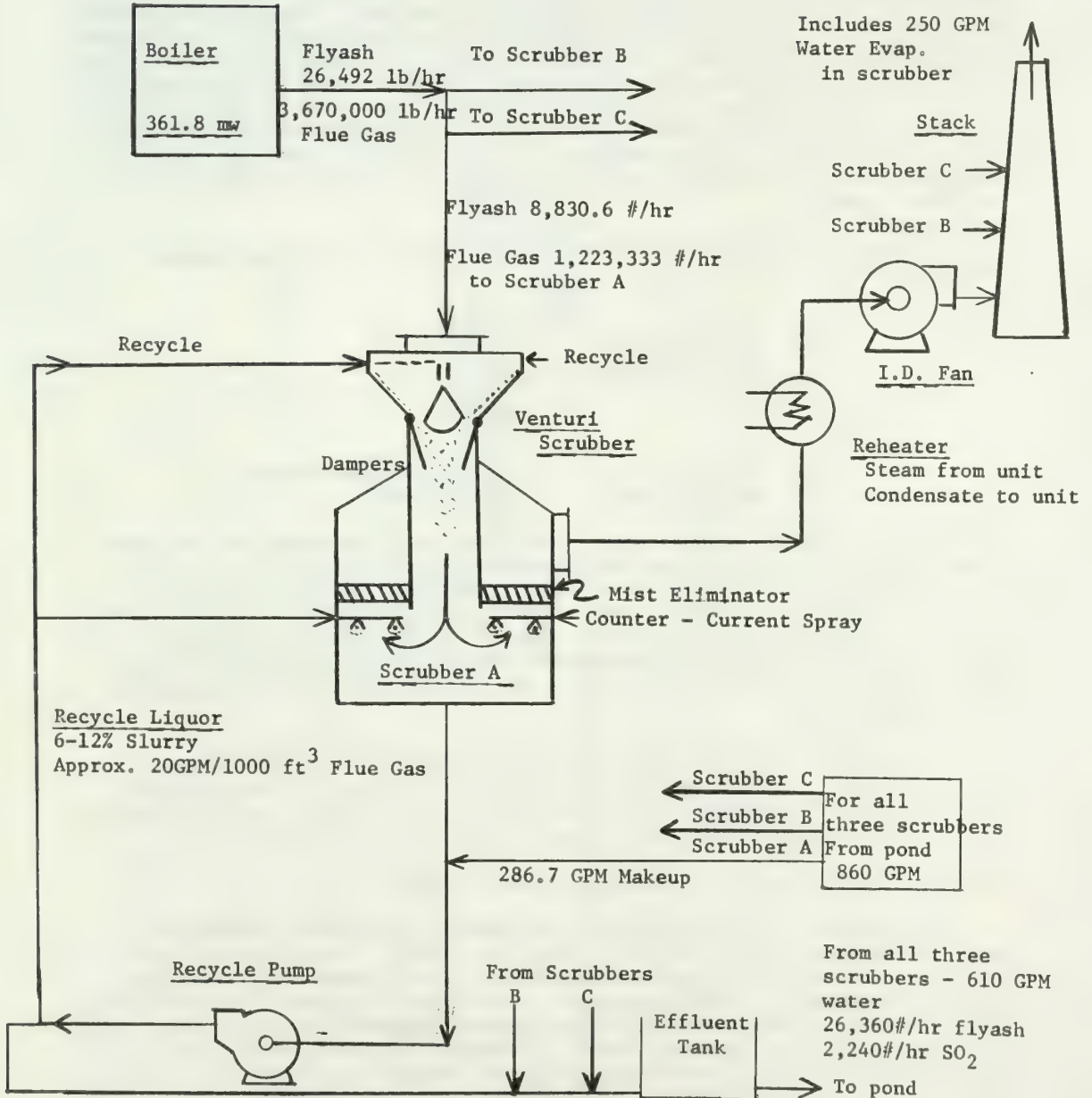
"The supplier of the system will be Combustion Equipment Associates, Inc., 555 Madison Avenue, New York, New York, 10022. The pollution control system consists of three venturi scrubber trains to handle flue gases from each 361.8 mw (gross) generating units. Each venturi scrubber train consists of a venturi scrubber, reheater, I.D. fan, and associated ductwork and piping. The bleed from three scrubber trains is combined and pumped to an ash pond. Each venturi scrubber provides two contacts between liquor and gas streams for optimum removal of both fly ash and  $\text{SO}_2$ . The first contact in the venturi throat section is of co-current flow type (both liquor and gas flowing in the same direction) whereas the second contact is counter-current flow type (liquor and gas flowing in the opposite direction) and occurs in the separator section--just below the mist eliminators where the flue gas is exposed to

SCRUBBER PROCESS FLOW SHEET  
Typical Each Unit

0.089 # flyash/10<sup>6</sup> BTU

Gas Flow--  
6,792,760 lb/hr  
@ 175°F

Includes 250 GPM  
Water Evap.  
in scrubber



sprayed liquor. Essentially all the fly ash removal is attained in the throat section with partial removal of  $\text{SO}_2$ , and the counter-current spray sections are used to optimize  $\text{SO}_2$  removal. <sup>2</sup>

"A portion of the total flue gas containing fly ash and sulfur oxides enters each venturi scrubber, where it is contacted with recycle liquor for fly ash and sulfur oxides removal. The accelerating flue gas shatters the curtain of liquor in the throat into small droplets. These droplets not only trap the dust particles but also provide mass transfer surface for absorption reagent.

"The flue gas and liquor flow downward through the down-comer section. The liquor settles by gravity into the integral recycle tank, whereas the flue gas turns 180 degrees for further contact with the recycle liquor in the counter-current spray zone.

"Each venturi scrubber is provided with recycle pumps (3 - 60% capacity, two operating and one spare) and piping. The bleed from the scrubber is taken from the discharge side of the recycle pumps, and after combining with the bleed from other scrubbers, is sent to the ash pond for final settling. The clear overflow from the ash pond is returned to the scrubber system. The makeup water, equivalent to evaporation plus liquor remaining with the ash pond cake, is added to the scrubber. The makeup water is to be supplied from the plant cooling towers blowdown (CTBD). Part of the CTBD makeup water, treated to the extent of reducing the dissolved solids of Ca ppm as  $\text{CaCO}_3$  to the river water level, is utilized in the form of sprays to clean any buildup occurring on the mist eliminators.

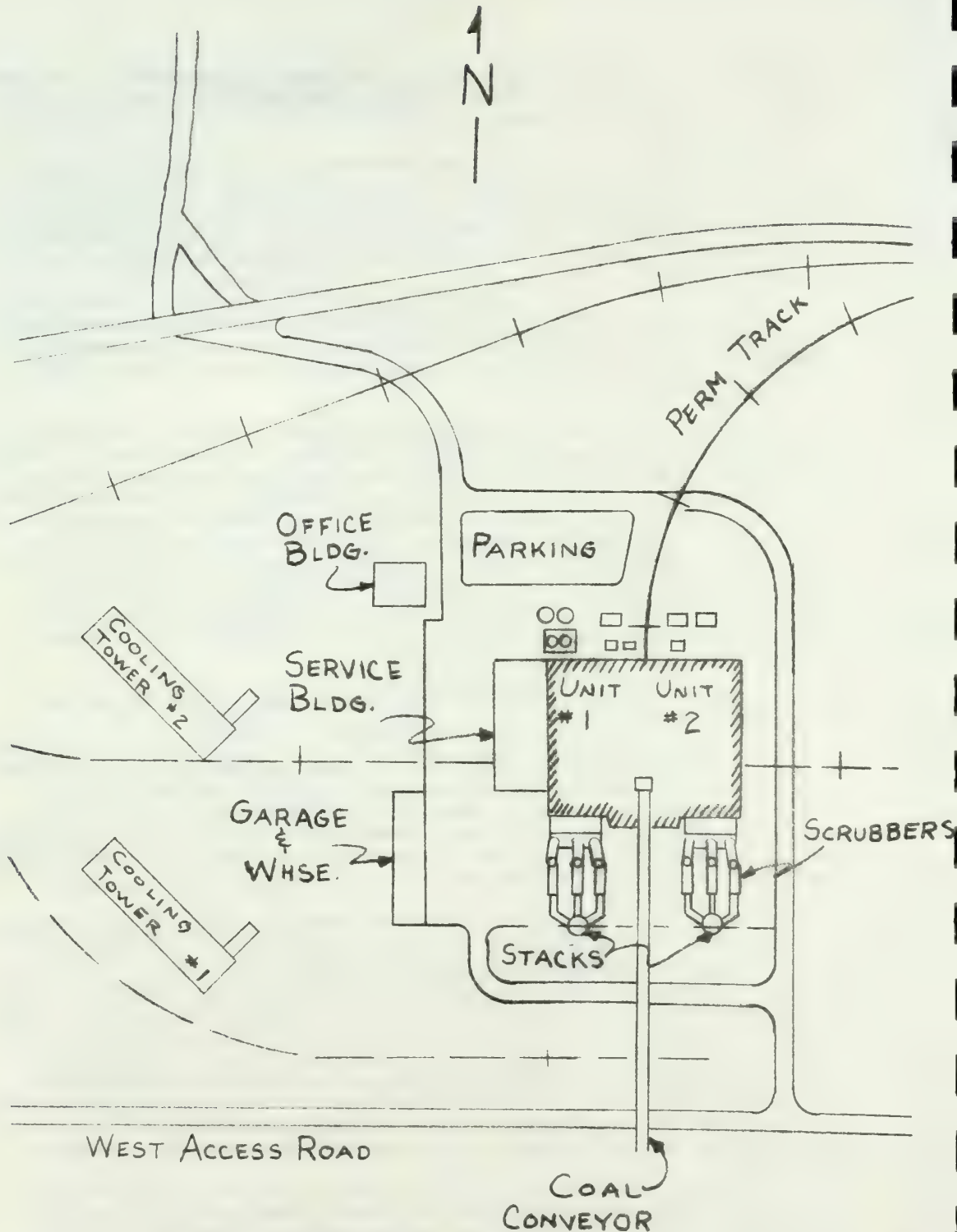
"The system is designed to use the alkali content of the fly ash for  $\text{SO}_2$  removal.

"The materials of construction for all pumps and piping are rubber lined and the system is designed with utmost care to minimize scaling, buildup, erosion and corrosion problems. Using the fly ash as the source of alkali for the process will require a slurry concentration of 6 to 12% in the recycle loop, and this condition will help minimize scaling problems by providing an abundant source of seed crystals for scale to form on.

"The cleaned flue gas then enters the chevron-type mist eliminator where any entrained liquor droplets are efficiently separated and collected from the flue gas. A spray washing system--both above and below the mist eliminator--is provided to prevent any significant buildup on the eliminator section. The entrainment free flue gas is reheated in a steam coil type reheater before entering an induced draft fan. Three sets of plate coil type indirect steam reheaters are provided for reheating the scrubber flue gas by a maximum of  $50^\circ\text{F}$ . Soot blowers are included to clean out any possible buildup on the heat exchange surfaces. The dry I.D. fans, one for each scrubber train, handle flue gases leaving the reheaters. The flue gas is combined with the flow from the other scrubber trains and discharged to the atmosphere through a stack.

"The attached scrubber process flow sheet illustrates the foregoing description. The open design of the venturi which will minimize plugging problems and the venturi's relative insensitivity to variations in operating conditions were factors in selecting this equipment."

Figure 3 shows the plant site.



COLSTRIP GENERATING PLANT

SITE PLAN  
1"=200'

FIGURE 3

## II. ENVIRONMENTAL SETTING OF PROPOSED POWER PLANT



## II. ENVIRONMENTAL SETTING OF PROPOSED POWER PLANT

### Topography

The power plant is located just outside the town of Colstrip, Rosebud County, in southeastern Montana. The site lies in the Northern Great Plains Province, east of the ranges that make up the Rocky Mountains. The topography is developed on essentially flat lying sediments of the Fort Union Formation which contains most of the coal in eastern Montana and adjacent states. Numerous sandstones and shales are associated with the coal seams.

The Fort Union Formation was laid down as the Rocky Mountains to the west were rising during the Paleocene, about 65 million years ago. The climate was much milder and wetter at that time and the streams carried the sediments from the mountains into the Fort Union Region. In this region, there existed large swamps, producing the many coal seams now found in southeastern Montana and adjacent states. Coal in the Colstrip area is ranked as sub-bituminous and is found in seams about 25 feet thick. During erosion of the Fort Union Formation, coal seams were exposed at the surface where they were sometimes ignited, starting underground coal fires. Many areas in this region have a pink to red rock known as clinker, a direct result of underground fires.

The elevations in the vicinity of Colstrip range from less than 2900 feet (msl) in the Rosebud Creek Valley about 12 miles east of Colstrip to over 4400 feet (msl) as near as 20 miles to the south. The elevation of Colstrip itself is about 3200 feet (msl). The topography exhibits a number of land forms which have been developed on the flat lying sediments of the Fort Union Formation. The rolling upland is dissected by the streams in the area, producing narrow valleys, buttes, and some fairly level land. The level areas are the well-developed flood plains of certain stream valleys.

Colstrip lies within the upper Missouri drainage basin, on the East Fork of Armells Creek, which drains directly into the Yellowstone River. Rosebud Creek also drains an area very close to Colstrip and flows from the southwest of Colstrip to the east and then north into the Yellowstone River. The Yellowstone River flows from west to east

and is located about 30 miles north of Colstrip. There are numerous small streams in the area, most of which are intermittent, because of varying frequency and amount of annual precipitation.

Figure 4 shows the Colstrip area.

### Population

The present population of Colstrip is 200. The population density in the area immediately surrounding Colstrip is very low, about one to two persons per square mile, mostly ranchers. The town of Lame Deer, population 650, is about 18 miles south of Colstrip, and Forsyth, population 1900, is about 30 miles north of Colstrip in the Yellowstone Valley. Billings, with a population of nearly 80,000, is about 90 miles west of Colstrip. Miles City lies in the Yellowstone Valley about 50 miles to the north-east. The Northern Cheyenne Indian Reservation lies south of Colstrip.

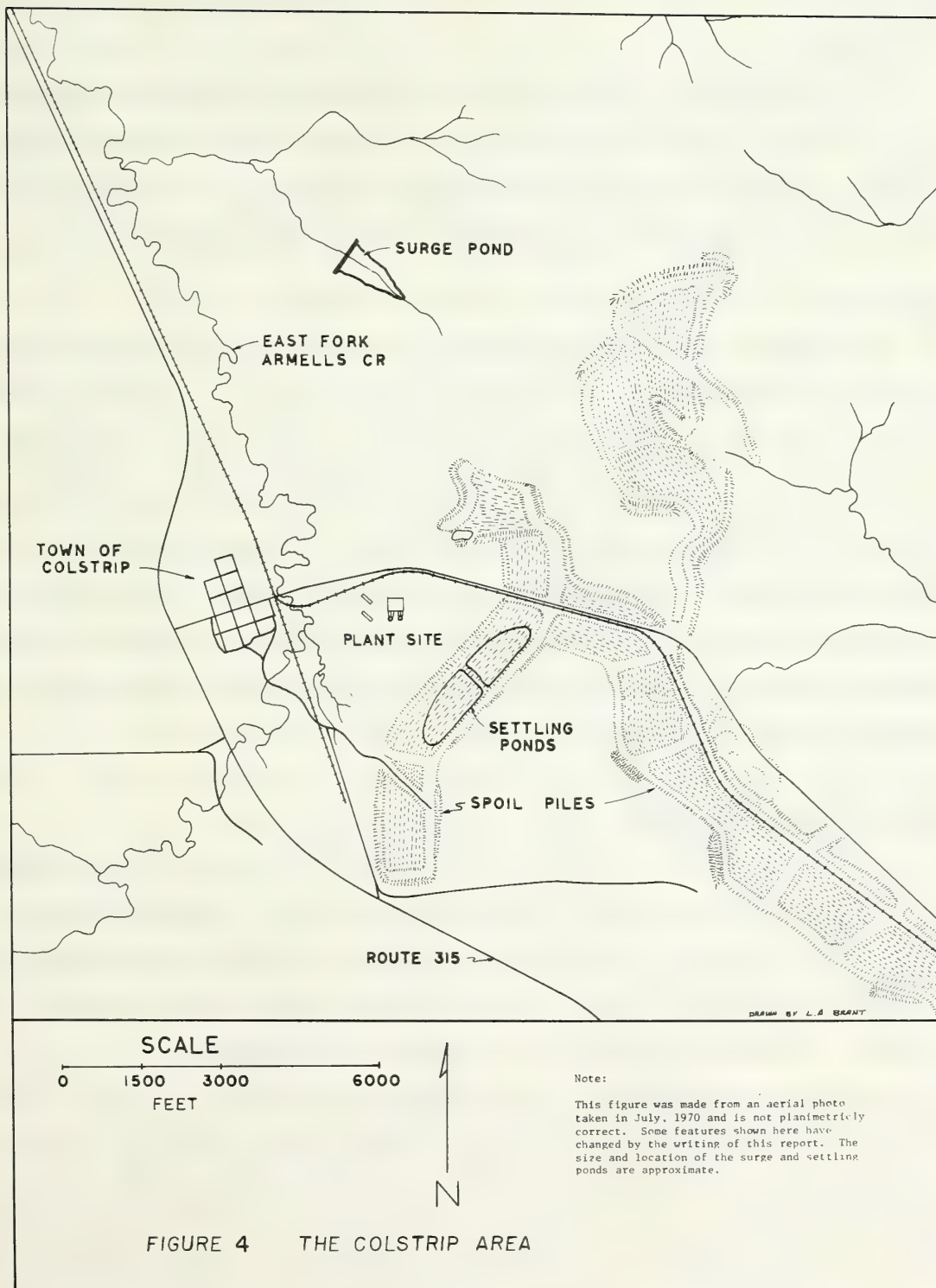
### Land Use

Ranching and other agrarian pursuits comprise the bulk of the land usage in the Colstrip area. The ranches are generally a combination of grazing and dry-land crop farming. Soil and moisture are such as to permit some tillaged and irrigated agriculture in the valley bottoms, with crops such as alfalfa hay, wheat, oats, and barley.

There are some forested areas in the vicinity and a portion of the Custer National Forest lies southeast of Colstrip. Some lumbering is done in this area, but the scale is small compared to the lumbering activity in Western Montana. Coal is presently being mined in two places near Colstrip--the Western Energy Mine at Colstrip and the Peabody coal mine a few miles south. In other areas, coal is being mined by the Decker Coal Company at Decker, about 60 miles to the south, and by Knife River Coal Company at Savage, about 150 miles to the northeast.

### Historical Values

The Indians were the first inhabitants in southeast Montana and staged some valiant battle efforts in defense of their territory. Custer's Last Stand and the Battle of



the Rosebud are only two examples of the activity during the late 19th century in this area.

The archaeology of the proposed plant and mine site at Colstrip has been studied by a team from the University of Montana, under contract with the Western Energy Company. No significant archaeological material was found, in the opinion of the study team. The relevant portion of the study is included in the appendix.

### Recreation

Southeastern Montana offers some excellent recreational opportunities. The Custer National Forest has a number of campgrounds used by local people and tourists. The pronghorn, mule deer, and whitetail deer provide big game hunting to residents and non-residents of Montana. Ring-necked pheasants can be found along the Yellowstone River Valley and Hungarian partridge, sage grouse, and sharptail grouse offer good upland bird hunting. Sport fishermen can find walleye, sauger, and northern pike in the various water courses, especially the Yellowstone River. Ponds near Colstrip have trout and there are reports that a paddlefish spawning ground is developing in the Yellowstone River near Forsyth.

### Meteorology and Climatology

Southeastern Montana is in the mid-latitudes which has a prevailing westerly air flow aloft. The major east-west storm track across the U. S. passes through the center of the state. The area is considered semiarid and, as a whole, has what may be termed a modified continental climate. Within the general climate type, topographic effects provide a wide range of temperature and precipitation patterns.

The winters are quite cold, with invasions of cold arctic air from the north being occasionally interrupted by storms from the Pacific Ocean. Spring and early summer are the wettest parts of the year, with the heaviest rains coming from storms involving moisture from the Gulf of Mexico, mostly in May and June. The combination of early-growing season precipitation with rapid temperature warming in May and June, followed

by hot, dry summers has helped to produce a stable agricultural base in the arable section of southeastern Montana.

Total precipitation averages about 15 inches per year. The annual mean temperature is 46 degrees with maximum recorded high 110 degrees, and the minimum recorded low -50 degrees. Maximum hourly wind on record is 73 miles an hour, with gusts to 95 observed.

A full year's preliminary meteorological data from a study performed at Colstrip by Montana State University has been received by the state. Included in this data were wind directions, wind speeds and temperature parameters for Colstrip. The study year included the period from November 12, 1971, through November 11, 1972. Most of the wind data were collected at the top of a 307-foot tower. The inversion data were taken from thermocouple positions at the 59 and 294-foot levels on the tower with supplemental information available from aircraft soundings.

Vertical temperature profiles indicate that there were 215 inversions during the year. There were an average of about 17 inversions per month, with durations from 10 to 24 hours and 14 over the year lasting longer than 24 hours. It should be noted that the short inversions normally develop at night when air nearest the ground is radioactively cooled below the temperature of air higher in the atmosphere. These nighttime inversions usually are weak and are broken when the sun warms the ground which in turn warms the lower layers of air. Inversions of this type thus do not normally last beyond the warmest period of the day.

The short inversions, lasting between 10 and 23 hours, were most common in August, September, and October. Also, the data seem to indicate the inversions were strongest during the fall and early winter with over 24 percent of December having extremely stable atmospheric conditions.

There were generally 15 to 50 inversions per month of durations less than 10 hours.

The 14 inversions lasting more than 24 hours occurred during the winter months. There were seven in December, three in January, four in February. The longest inversion lasted 67 hours, and occurred in December. Several other inversions lasted more than two days.

Figures 5, 6, 7, 8 and 9 are from the MSU data.

# COLSTRIP WIND ROSE

Compiled from wind data taken at Colstrip, Montana by Montana State University for the Montana Power Company. Instrument was in operation at top of 307 foot tower from November 12, 1971 - November 11, 1972.

FIGURE 5

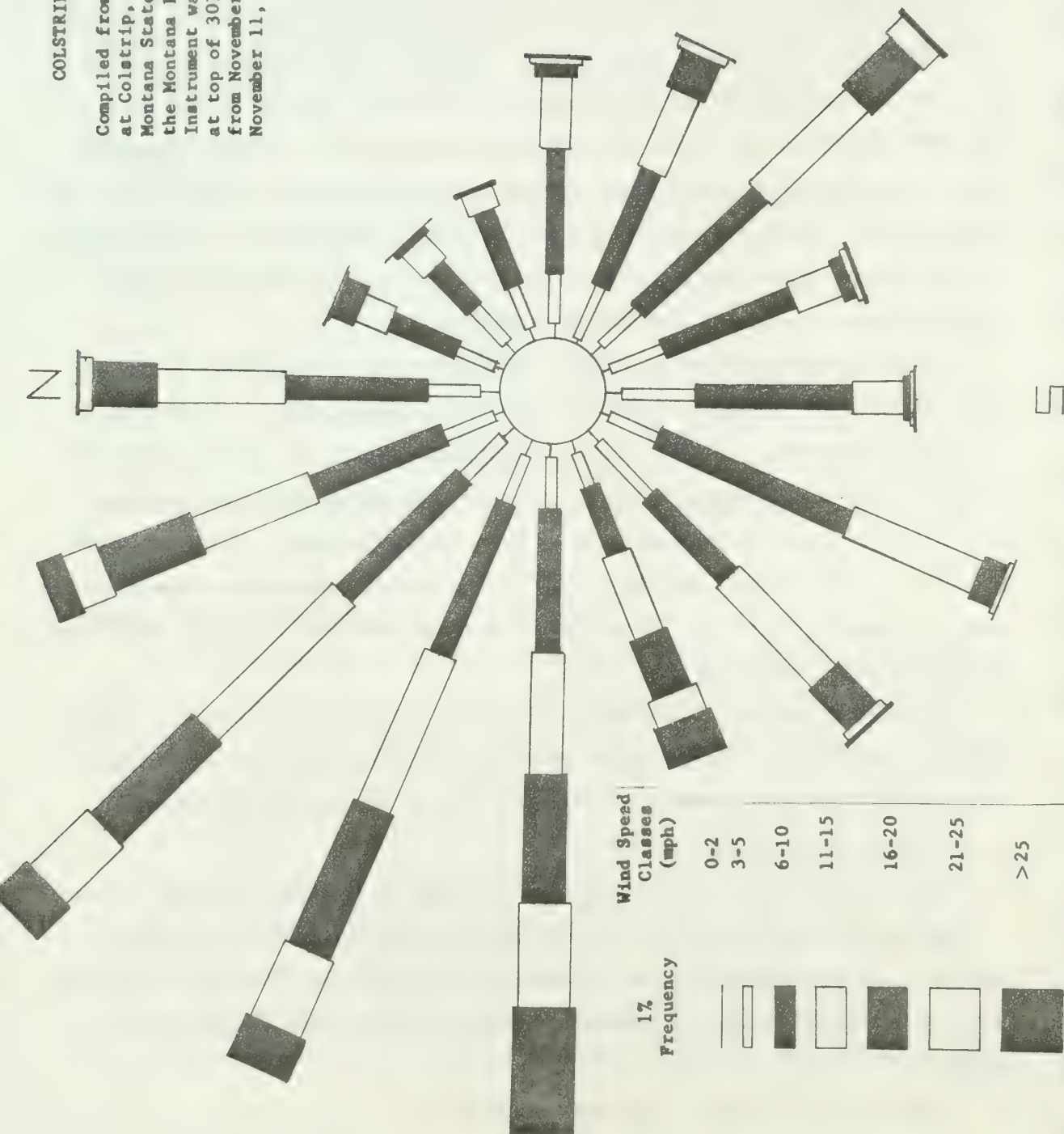


FIGURE 6

Frequencies of Tops of Early Morning Ground-Based Inversions by Season at Colstrip

(Based on All Morning Aircraft Soundings)

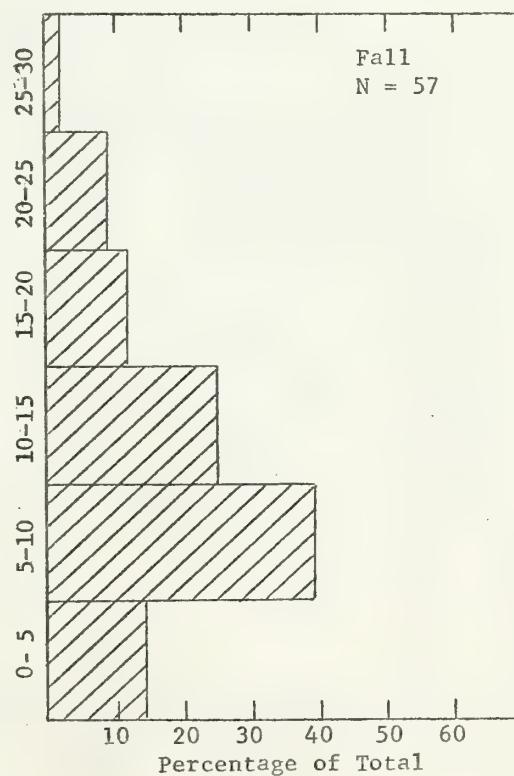
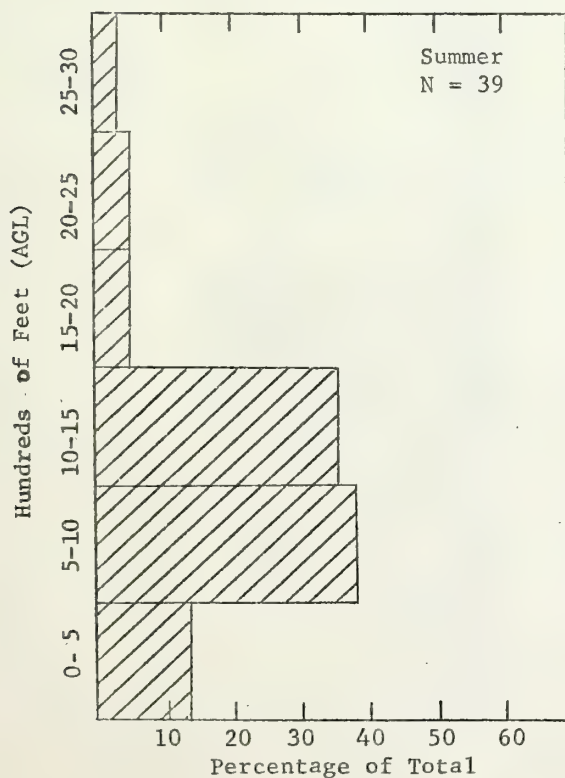
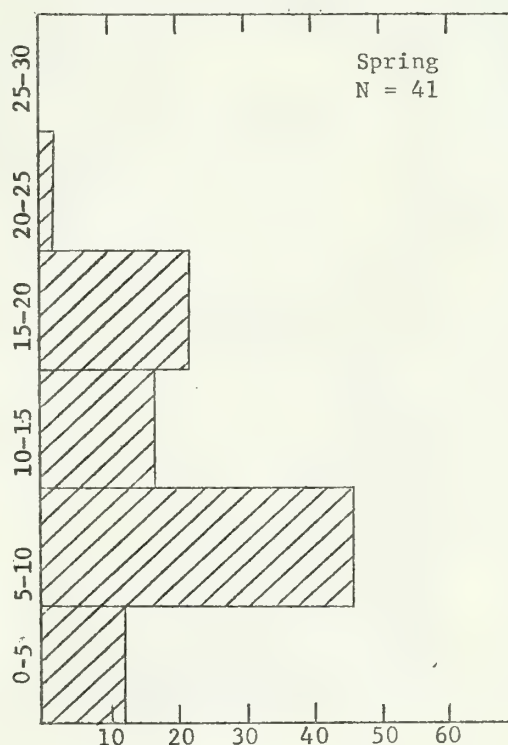
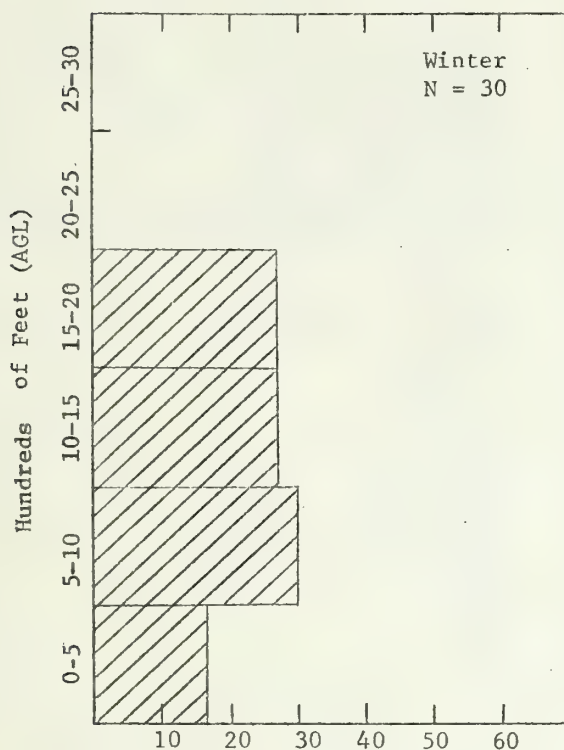
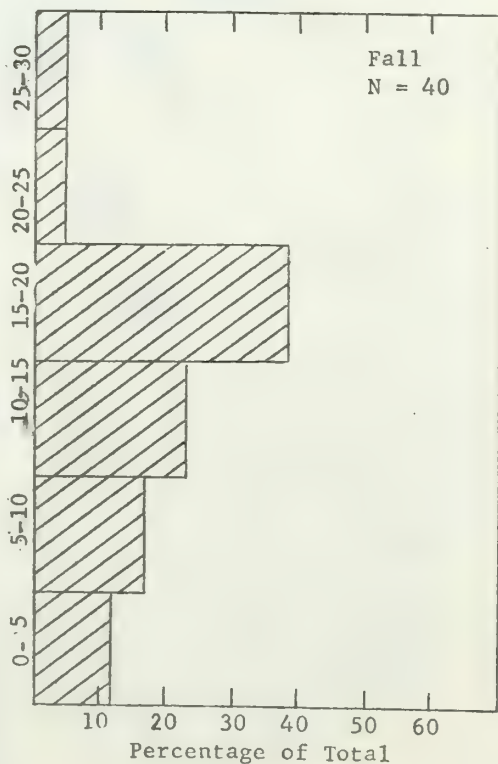
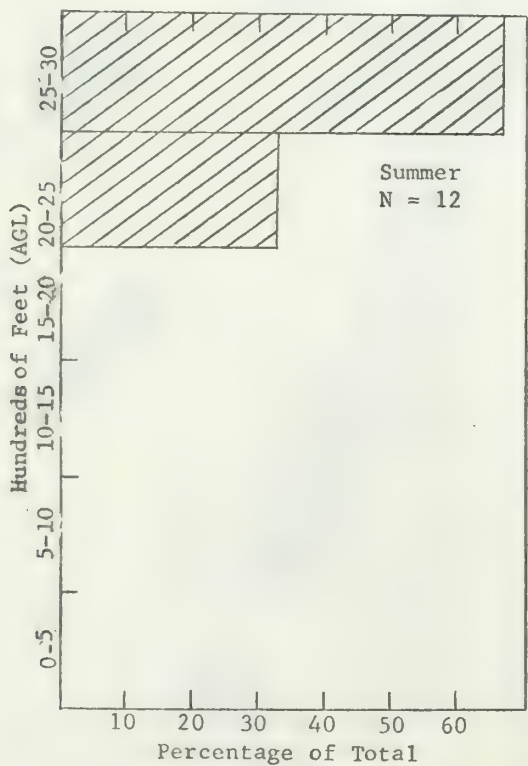
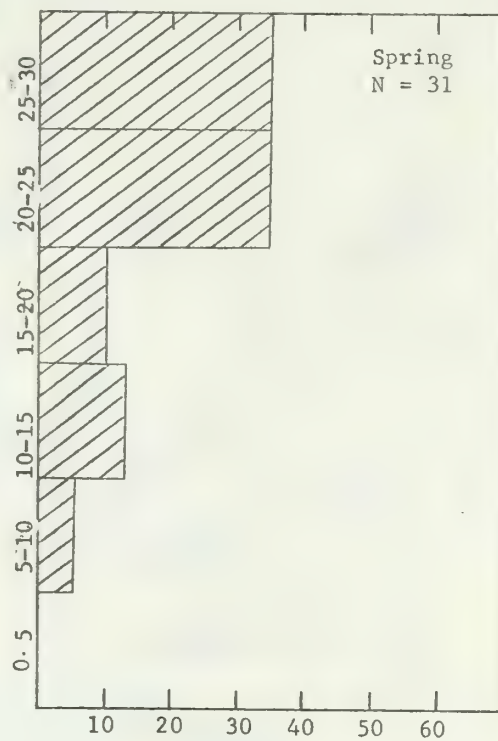
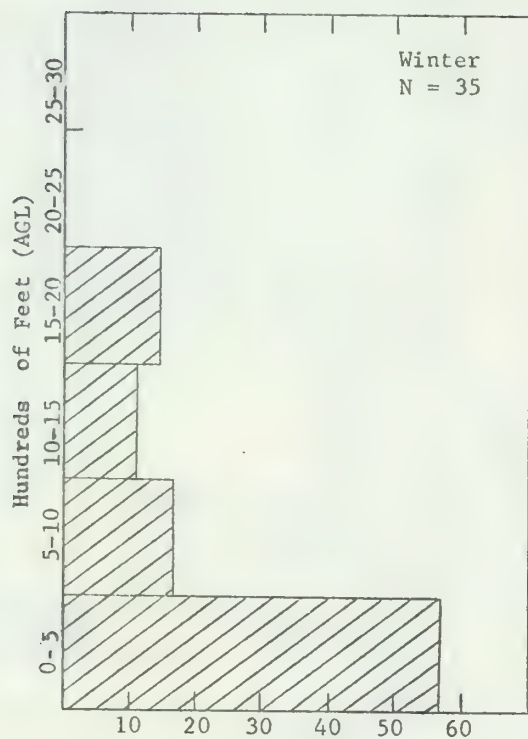


FIGURE 7

Frequencies of Maximum Mixing Depths by Season at Colstrip



Seasonal Wind Roses for 1053 Ft AGL

Based on Near Dawn Pilot Balloon Observations Nov 71 to Nov 72

(Numbers Indicate Mean Wind Speed)

wind blows toward center

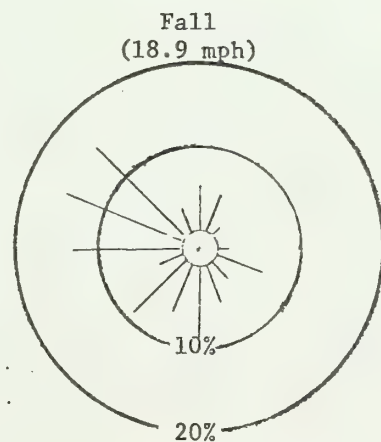
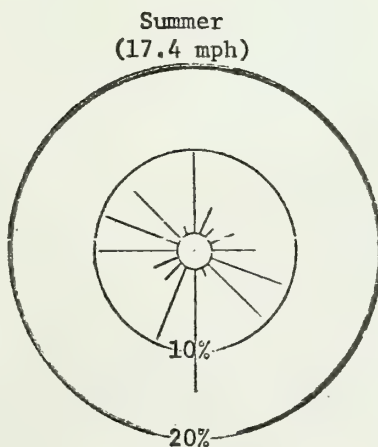
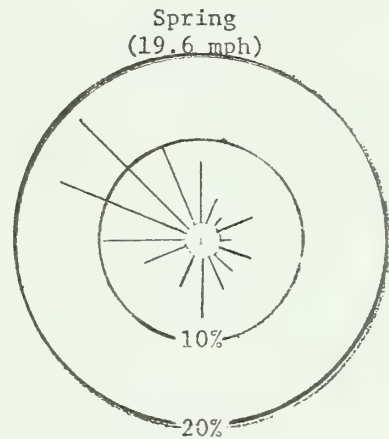
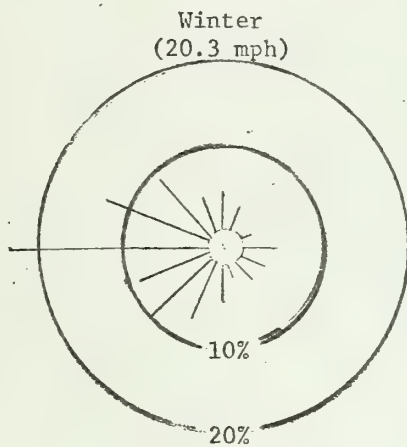


FIGURE 8

Seasonal Wind Roses for 1053 Ft AGL

Based on Mid-Afternoon Pilot Balloon Observations Nov 71 to Nov 72

(Numbers Indicate Mean Wind Speed)

Wind blows toward center

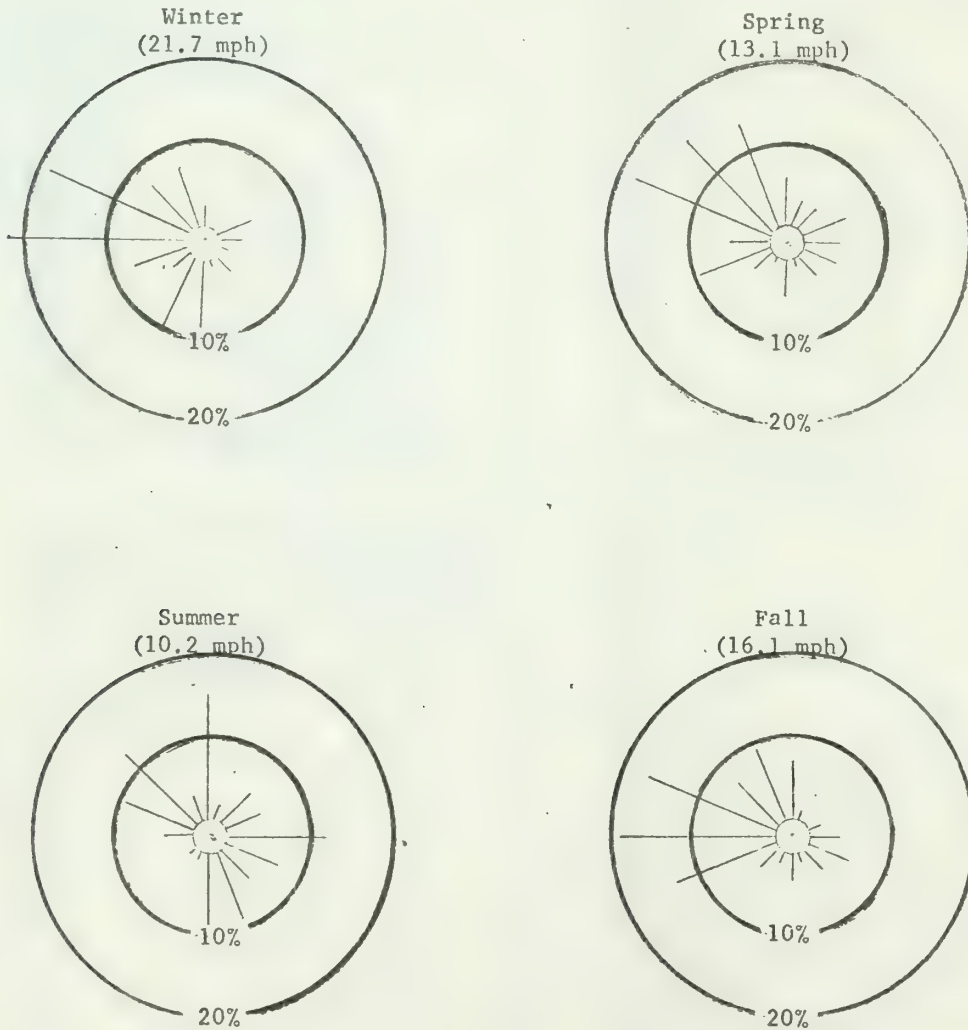


FIGURE 9

### III. PROBABLE IMPACT ON THE ENVIRONMENT



### III. PROBABLE IMPACT ON THE ENVIRONMENT

#### Emissions and Effects

Stack emission from the proposed power plant probably poses the greatest potential primary impact on the environment. Other aspects imposing primary impacts are cooling tower emissions to the atmosphere, ash and water discharge onto the land and direct disturbance of the land from mining. These impacts and others are investigated in varying degrees of detail in this section.

From the Final Environmental Statement for the Jim Bridger Thermal Electric Generation Project, submitted by the Bureau of Land Management for the proposed plant in western Wyoming, the following questions were raised:

1. Will the plant comply with state and federal emission and air quality standards?
2. What will be the effects of emission even if the plant complies?
3. What guarantees are there that the equipment will function as designed, and who will monitor companies in operation to see that they carry out their plans?

These questions were developed from responses to the draft environmental impact statement on that project.

The state of Montana is required to enforce federal standards established by the EPA where they are more stringent or more inclusive than state standards. For some pollutants, such as mercury, Montana has established no standards. Table 1 gives state and federal ambient air quality standards and compares them with projected maximum concentrations for the Colstrip area. Particulate, SO<sub>2</sub>, and trace metal emissions are functions of coal composition. The estimated emissions listed in Table 2 are compared with state and federal emission standards.

Data for estimated emissions were supplied by the applicant, and projected concentrations are calculated from these figures using a simulation technique known as diffusion modeling.

AMBIENT AIR QUALITY STANDARDS AND PROJECTED MAXIMUM CONCENTRATIONS

<u>Pollutant</u>	<u>Montana Standard</u>	<u>EPA Standard</u>	<u>Proposed Plant (Two Contribution Units)</u>
Particulate	75 ug/m <sup>3</sup> 200 ug/m <sup>3</sup> (24 hr. max)	(Annual geometric mean) 60 ug/m <sup>3</sup> (Annual geo. mean) 150 ug/m <sup>3</sup> (24 hr. max)	0.1 ug/m <sup>3</sup> (Annual)* 2.0 ug/m <sup>3</sup> (24 hr.)*
Sulfur Dioxide	0.02 ppm (Annual Arith. Mean) 0.10 ppm (24 hr. average) <sup>1</sup> --- 0.25 ppm (1 hr. average) <sup>3</sup>	0.02 ppm (Annual Arith. mean) 0.10 ppm (24 hr. average) <sup>2</sup> 0.50 ppm (3 hr. average) <sup>2</sup>	0.001 ppm (Annual max.)* 0.02 (24 hr. max.)* 0.14 ppm (24 hr. max.)* 0.14 ppm (1 hr. max.)*
Nitrogen Oxides	---	0.05 ppm (Annual Arith Mean)	0.001 ppm (Annual)*
Fluorides	1 PPB (24 hr. average)		.020 PPB (24 hr. Max )* (Uncontrolled)

\*Diffusion Modeling Results

<sup>1</sup>Not to be exceeded over 1% of the days in any 3-month period

<sup>2</sup>Not to be exceeded more than once a year

<sup>3</sup>Not to be exceeded for more than one hour in any four consecutive days

TABLE 1

# EMISSION STANDARDS & ESTIMATED EMISSIONS

<u>Substance</u>	<u>Montana Standard</u>	<u>EPA Standard</u>	<u>Proposed Plant (2 Units)</u>
Particulate	0.154 lb/10 <sup>6</sup> BTU input 1050 lb/hr	0.10 lb/10 <sup>6</sup> BTU input 682 lb/hr	0.039 lb/10 <sup>6</sup> BTU input 266 lb/hr
Sulfur Dioxide	1.0 lb of S/10 <sup>6</sup> BTU input 13,640 lb/hr	1.2 lb of SO <sub>2</sub> /10 <sup>6</sup> BTU input 8160 lb/hr	1.0 lb of SO <sub>2</sub> /10 <sup>6</sup> BTU input 6820 lb/hr
Nitrogen Oxides	_____	0.7 lb/10 <sup>6</sup> BTU input 4774 lb/hr	<0.7 lb/10 <sup>6</sup> BTU input <4774 lb/hr
Fluorides	_____	_____	2.0 lb/hr (controlled)
Carbon Dioxide	_____	_____	1,454,000 lb/hr
H <sub>2</sub> O	_____	_____	710,000 lb/hr

TABLE 2

## Diffusion modeling

A diffusion model was used to predict atmospheric, ground level concentrations from the two power plant units at Colstrip. A diffusion model uses various meteorological and emission parameters to predict pollutant concentrations. The modeling techniques used were approved by the EPA.<sup>34,27</sup>

Following are some of the assumptions made in diffusion modeling.

The concentration of emissions remains uniform in time. The material diffused consists of stable gases and aerosols smaller than 20 microns. No material is removed from the plume when the plume strikes the ground or other object. Pollutants are distributed on a normal statistical curve from the center line of the plume.

Because of the variability of the atmosphere, diffusion modeling is considered accurate only within a factor of two. Thus, actual concentrations may be half or twice values computed.

Diffusion modeling indicates that only in rare cases will either state or federal ambient air standards be approached. That these standards are considered adequate is confirmed by the following statement by the Administrator of the Environmental Protection Agency in establishing the national primary and secondary air quality standards:

"National secondary ambient air quality standards are those which, in the judgment of the Administrator, based on air quality criteria, are requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of air pollutants in the ambient air."

Emissions from the proposed plant are expected to drift east. The relatively high (500 feet) stacks are expected to disperse the emissions over a wide area.

No other major emission source exists within a 90-mile radius of Colstrip, therefore, no additive effects are foreseen. The Southwest Energy Study, compiled by a Federal Task Force for the Four Corners Region, indicated:

"No significant additive effects of the concentrations covered by one plant on those of another plant if they are separated by 100 km or more."

Possible additive effects will be investigated in detail should additional plants be proposed for this region.

## Particulate

Using data furnished by the applicant and quoted in Table 2, combined full load particulate emissions from both units of the plant will not exceed 267 pounds per hour (3.2 tons/day). Some increase in atmospheric particulate loading will result from the plant emissions, but these emission rates are well within both Montana emission regulations and EPA New Source Performance Standards. Control to this degree required a 99.5% collection efficiency, removing 53,200 pounds per hour of particulate from the flue gases at full load.

To give perspective to the maximum emission rate of 267 pounds per hour from the Colstrip generating facility, it can be compared to Montana Power Company's Corette Plant in Billings. The Corette plant, less than 1/3 the size, emits 426 pounds per hour under full load.

In order to determine the background particulate concentration in the Colstrip area, the State has performed sampling for almost a year. Early in April, 1972, a rural sampling site was chosen to define background ambient air values. The data from a location some nine miles east of Colstrip are presented for the period from April 6 to September 3, 1972, as follows:

TABLE 3

	Number of Samples	High Value	Low Value	Geometric Mean	Arithmetic Mean
Total Suspended Particulates (24-hr. average concentrations in ug/m <sup>3</sup> )	23	191	3.7	22	35.5

One shortcoming of the sampling resulted from placing hi-vol particulate samplers near dirt or gravel roads because of the need for electricity. The State intends to continue sampling, possibly to the extent of establishing sites an adequate distance from roads to obtain better background data. Of the data in Table 3, the significant

value is  $22 \text{ ug/m}^3$ . For a whole year, it is estimated that the total suspended particulate value will be approximately  $15 \text{ ug/m}^3$ . The national secondary standard is  $60 \text{ ug/m}^3$  which is four times the particulate background value estimated for the Colstrip area.

Maximum ground level concentrations for various pollutants have been obtained from diffusion modeling estimates as presented in the following section on sulfur oxides.

From modeling, a  $2 \text{ ug/m}^3$  plant contribution for a 24-hour average (Table 5) was estimated with adverse weather conditions. This value is very low compared to the national 24-hour secondary standard of  $60 \text{ ug/m}^3$  for total suspended particulates. Considering the background value of  $15 \text{ ug/m}^3$ , the addition of the  $2 \text{ ug/m}^3$  value results in a total estimate of  $17 \text{ ug/m}^3$ .

However, one must consider road dust, which will increase due to greater population and mobility of that population, construction, and plant and mining operations. It is anticipated that an annual geometric mean for the area might approach  $50 \text{ ug/m}^3$ .

TABLE 4  
MAXIMUM GROUND LEVEL CONCENTRATIONS FOR TWO 350 MEGAWATT UNITS

Period Pollutants	10 min.	1 hour	3 hour	24 hour	Annual
Particulates ( $\text{ug/m}^3$ )	-	-	-	2.0	0.10*
Sulfur Oxides ppm	0.18	0.14	0.11	0.02	0.001*
Nitrogen Oxides ppm as $\text{NO}_2$	-	-	-	0.02	0.001*
Fluorides (PPB)	.183	.14	.11	.020	.0012*

\*EPA Diffusion Model

## Sulfur Oxides

Data submitted by the applicant and listed in Table 2 specify that sulfur oxide emissions from the proposed Colstrip plant will not exceed 1 lb/million BTU input to the system. This totals 6820 lbs/hour for the two units (82 tons per day) representing emission control efficiency of approximately 39%. Coal analysis reveals an average of 0.77% sulfur-in-coal.

Montana regulations limit emissions to 1 lb of sulfur/million BTU input or the equivalent of 2 lbs of sulfur dioxide/million BTU input. Federal New Source Performance Standards for Fossil Fuel-Fired Steam Generators limit sulfur dioxide emissions to less than 1.2 lbs/million BTU input.

The following paragraph, taken from the applicant's permit application, explains the proposed sulfur oxide control system at the plant:

"...This is a full stream scrubber system that will simultaneously remove fly ash and sulfur dioxide. The removal is accomplished by scrubbing the flue gas with an alkaline solution of water and calcium carbonate, which is generally available from the fly ash. If the alkalinity of the ash varies to a point where additional alkalinity must be added, it is obtained by the addition of soda ash ( $\text{Na}_2\text{CO}_3$ ) or lime ( $\text{CaO}$ ). The gaseous sulfur dioxide will react with the calcium carbonate to form solid calcium or sodium salts. At the same time, the mechanical action of the scrubber traps fly ash particles in the water droplets. Recirculation within the scrubber system makes the alkalinity in the ash available for the process. The used scrubber solution, newly formed salts, and trapped fly ash are piped to an ash pond where the solids settle out. The pond water is then recirculated back to the scrubber in a closed loop system from which no water is discharged to any natural bodies. This emission control system is guaranteed to limit the sulfur oxide emissions to 1.0 lb  $\text{SO}_2$ /million BTU and the fly ash emissions to .018 grains per actual cubic foot, at any operational load of the power plant."

Background sulfur dioxide values have been gathered in the Colstrip area for a one-year period (September, 1971, - September, 1972). See Figures 10 and 11, Appendix, for maps of the sampling sites in the general area. The data were obtained from monthly sulfation plate data using the conversion factor  $(\text{mg SO}_3/100\text{cm}^2/\text{day}) \times 0.035 =$  parts per million. See Table 16 in Appendix.

TABLE 5

## Sulfur Dioxide (ppm)

---

Number of Samples . . . . .	54
Annual Arithmetic Mean. . . . .	0.003 ppm

---

This arithmetic mean of 0.003 ppm should be significant as an average background value for the Colstrip area at present. Continued sulfur dioxide monitoring will be carried out by the State Department of Health and Environmental Sciences.

The draft statement estimated a maximum SO<sub>2</sub> concentration of .43 ppm, which would have violated the Montana standard requiring that .25 ppm of SO<sub>2</sub> for one hour not be exceeded more than once every four days.

Following publication of this draft, new information became available that indicated the SO<sub>2</sub> estimate in the draft was erroneous. The model and its results were refined with data from TVA power plants and supplemental meteorological information from Montana State University. Revised figures indicate SO<sub>2</sub> concentrations would not exceed .136 ppm under severe fumigation conditions.

Referring to Table 4, we again find conservative one-hour, three-hour, 24-hour, and annual estimated SO<sub>2</sub> concentrations. The state's annual SO<sub>2</sub> background value of 0.003 ppm is higher than the annual value of 0.001 ppm estimated by the EPA. It is possible that the annual average could be slightly in excess of 0.004 ppm.

The diffusion model was used to estimate particulate, sulfur dioxide, and nitrogen oxide concentrations.

A different model similar in design and theory was used by the EPA to estimate long term (annual) concentrations. Their results listed in Table 4 indicated no violation of the annual standards.

Estimates for oxides of nitrogen and particulate were made by multiplying the SO<sub>2</sub> results by the respective ratios of SO<sub>2</sub> emission to nitrogen oxide and particulate matter.

The state's experience in ambient monitoring of other industrial complexes around the state suggests that one-hour SO<sub>2</sub> concentrations approximating one part per million do occasionally occur under adverse weather situations. The terrain surrounding Colstrip does not rule out wind channeling, impingement and other phenomena which might cause higher SO<sub>2</sub> concentrations in the Colstrip area than the above diffusion predictions. A similar discussion could be developed for other emissions.

#### Nitrogen Oxides (NO<sub>x</sub>)

The boiler supplier for the proposed plant guarantees nitrogen oxide emissions will not exceed .7 lbs NO<sub>x</sub>/million BTU, the level specified in the Federal New Source Performance Standards. When the Colstrip plant is operating at full load, this amount will total 4750 lbs per hour of nitrogen oxides.

The following information was submitted by the Montana Power Company regarding NO<sub>x</sub> emissions:

"The steam generators at this installation will both be tangentially fired pulverized units.

"In order to insure an absolute minimum of nitrogen oxide formation, we have purchased an overfire air system as part of this equipment. This system takes the normal amount of combustion air and distributes it to a greater volume of the furnace than would normally be used in a tangentially fired unit. The greater distribution of combustion air reduces the maximum flame temperatures and the amount of nitrogen available for combination at any particular location in the flame. As a result, nitrogen oxide products will be substantially reduced below the low levels normally found on a tangentially fired unit.

"With the overfire air system, the supplier, Combustion Engineer, Inc., has guaranteed that the nitrogen oxides leaving the unit will not exceed .7 lbs/million BTU, which we understand is the current federal emission standard."

In its Background Information for New Source Performance Standards, the EPA stated:

"The NO<sub>x</sub> standard for solid fuels is based on results from tangentially fired units burning coal. Four tangentially fired units burning bituminous coal, which were tested by EPA, had emissions of nitrogen oxides that were well below the required level of 0.7 pounds per million BTU. Published data from numerous sources, and other test results from steam generator manufacturers, indicate comparable results for tangential firing . . ."

The State has done no background ambient sampling for nitrogen oxides. The EPA AP-84 publication "Air Quality Criteria for Nitrogen Oxides", page 3-1, states that the non-urban North American continental average levels of NO<sub>2</sub> are about 0.004 ppm. The source of this background NO<sub>2</sub> is biologically produced NO which under photochemical oxidation yields the NO<sub>2</sub> variety.

Extrapolation from the SO<sub>2</sub> dispersion model indicate low concentrations of nitrogen dioxide will result from the proposed plant.

#### Trace Elements

The quantities of most of the trace elements in Montana coal are not well known. The only element that has been analyzed sufficiently to warrant any confidence in the results is fluorine. Table 6 presents the best data that the state has on the elements shown.

TABLE 6

#### TRACE ELEMENT CONCENTRATIONS OBTAINED FOR COAL FROM WESTERN ENERGY MINE AT COLSTRIP

(Values in ppm by weight unless otherwise noted)

Al	0.74%	0.74%	Eu	.075	.085
Mg	.20%	.19%	Co	0.48	0.40
Fe	.20%	.069%	Br	9	33
Mn	100.	91.	Sc	1.0	1.0
V	7.4	3.6	Hf	0.77	0.81
Ti	430.	330.	Cr	3.0	2.8
La	3.8	4.0	Tb	.065	0.056
Na	150.	140.	Ta	0.24	0.26
Sm	0.55	0.50	Cu	<100.	<80.
Th	1.5	1.3	3* (Mean of six other Montana coals = 3.16*)		
U	0.7*	(Mean of six other Montana coals = 1.13*)			
R <sup>226</sup>	2.8	pCi/g* (Mean of six other Montana coals = 3.31*)			

Values obtained by Battelle Northwest for EPA except\*

\*Values obtained by EPA

Trace element concentrations in the coal only partially determine adverse environmental effects. The form in which a particular element leaves the boiler will

partially determine how it is affected in the control devices and its behavior in the environment. There are few plants of the Colstrip type with venturi scrubbers, and how their operation affects trace element emissions are not known at this time.

Certain trace elements are of particular interest and will be dealt with separately.

### Fluorine

Values for the concentration of fluorine in the coal at Colstrip have ranged from less than one ppm to 140 ppm. Since the writing of the draft statement, the state has performed a number of analyses for fluorine in the coal according to standard procedures. Since that time, some other laboratories have revised their values and there is now general agreement among two commercial laboratories and the state on a value between 30 to 40 ppm dry weight on splits of seven samples. A third commercial lab reported a mean value of 25 to 30 ppm for these same seven samples. These values correspond with the state's values for other samples of coal also from the Rosebud Seam at Colstrip. Therefore, the very high ( $>100$  ppm) and the very low ( $<5$  ppm) values seem to be in error.

Also, since the writing of the draft supplement to this statement, this Department has analyzed the collected ash from the Corette plant for fluorides and has sampled fluoride emissions from the stack gases also at the Corette plant. The presence of fluoride in the various kinds of ash show that not all of the fluoride in the coal is released into the air. In addition to these data, a series of tests have been run on a pilot venturi scrubber to determine fluoride removal efficiencies. These tests indicate that about 90 percent of the total fluorides will be removed by the wet scrubber. Taking all the data we have regarding fluorine, we can estimate the emission rate of fluorides and use this figure and the diffusion model to arrive at worst possible ambient concentrations.

Assuming 35 ppm fluorine in the coal, 585,300 pounds (dry weight) of coal burned per hour, and only 10 percent of the fluorine emitted into the air, we arrive at an

emission rate of 2.05 pounds fluoride per hour (.26 g/sec). At this emission rate, the maximum 24-hour concentration that can be expected is .02 ppb as compared to the state standard of 1.00 ppb for a 24-hour average.

TABLE 7  
Fluoride Analysis of Coal and Ash (ppm dry weight)  
from Corette Plant

Belt Coal Oven Dry Samples

Laboratory	Truesdale	WAR	Radian	State
No. of Values	7	7	7	7
Min.	11	34	25.1	20
Max.	38	40	38.2	43.5
Mean	26.1	37.3	33.1	29.8

Pulverized Coal

	Truesdale	WAR	Radian	State
No. of Samples	7	7	7	6
Min.	11	36	26.7	25
Max.	45	41	38.2	46
Mean	29.0	38.0	32.4	33.3

Bottom Ash

	Truesdale	WAR	Radian	State
No. of Samples	3	3	3	3
Min.	25	2.4	0.1	0
Max.	33	7	0.1	0
Mean	29	5.0	0.1	0

Economizer Ash

	Truesdale	WAR	Radian	State
No. of Samples	3	3	3	3
Min.	33	41	25	8
Max.	45	102	70	75
Mean	38	64	42	34

Precipitator Ash

	Truesdale	WAR	Radian	State
No. of Samples	3	3	3	3
Min.	51	236	103	162
Max.	65	302	158	216
Mean	57	267	128	181

### Mercury

It is difficult to analyze coal for mercury and obtain reliable values. Since mercury is quite volatile, it may evaporate from a coal sample during handling and the sample may easily be contaminated in the laboratory. This problem is difficult to overcome even with the most careful handling. Even samples prepared for use as standards

can show variation in the mercury content (Norm Suhr, personal comm.). The author of a recent article in Science which reported 33 ppm Hg in a sample of Montana coal (considered a very high value) has said recently that the value is in error, probably the result of contamination of the sample.<sup>16,17</sup>

A commercial laboratory under contract with Montana Power Company reported that mercury concentrations in the Rosebud Seam are less than 0.1 ppm. Given the difficulties associated with mercury analyses and the unreliable data obtained from this laboratory on another trace element, the mercury value cannot be relied upon.

There are no reliable data concerning mercury in Montana coal. However, the state has no reason, at this time, to think Montana coal has either more or less mercury than coals from other parts of the U. S. (1-3 ppm).<sup>7</sup>

The laboratory working for Montana Power Company reports that 97 percent of the mercury remains in the ash. The Department does not accept this conclusion. Other reports indicate approximately 90 percent of the mercury in the coal is emitted into the atmosphere as a vapor.<sup>8</sup> What effect the wet scrubbers, with their lower temperatures, will have upon the mercury vapor is not known. It is likely, though, that the wet scrubbers will remove a higher percentage of the mercury than other types of control devices in use on most of the coal-fired power plants in the U.S.<sup>11,31</sup>

#### Selenium

Selenium compounds released in the combustion of coal may be either gaseous or particulate. In either case, they would be collected at a high efficiency by wet scrubbers. The particulate would be expected to be collected at close to 99 percent efficiency, just as other particulate matter. The gaseous portion, probably hydrogen selenide, is extremely soluble in water, thus lending itself to collection in wet scrubbers.<sup>32</sup>

#### Radioactive Elements

Several of the trace elements are of particular interest because they are radioactive. Uranium is not very abundant in the earth's crust but it is found in many

kinds of rocks. Being radioactive, uranium breaks down into lighter elements. At that time, it emits some form of radiation. The new elements which result from a uranium decay are called daughter elements, some of which are also radioactive. The radioactive daughter elements also undergo decay until a stable isotope is formed. There are a number of isotopes in the uranium decay series between uranium and lead. Some isotopes have a very short half-life (time for one half of a given quantity of a radioactive substance to disintegrate) and some have long ones. Uranium<sup>238</sup> has a half life of about  $4.5 \times 10^9$  years. This long half-life enables the element to be acted upon by geological processes which may concentrate the element in certain kinds of rocks. Some coal and black shales have anomalously high concentrations of long-lived radioactive isotopes. The isotopes with short half-lives can be formed and undergo decay while in the coal (age of Colstrip coal is about 60 million years). However, these isotopes are continuously being formed by the heavier isotopes.

Natural radioactivity of some of the Colstrip coal has been determined. The small amounts of uranium and thorium with their long half-lives are not likely to pose any threat to the environment. Radium<sup>226</sup> is the most likely to pose a threat.<sup>21</sup> (The units for radium<sup>226</sup> in Table 7 are picocuries per gram of coal. The term picocurie ( $10^{-12}$  curies) is a unit of activity, not a unit of mass. The activity unit is used here to separate R<sup>226</sup> from other radioactive isotopes, each having its own level of radioactivity (half-life). The activity units can be treated as mass units in diffusion modeling and since it is activity that is of interest, the exchange of units is acceptable.)

By figuring the amount of activity of R<sup>226</sup> which goes through the boiler and applying the diffusion model, an ambient activity can be obtained for groundlevel under the worst meteorological conditions expected. Assuming 3.0 pCi/g (dry wt) for an average value of radium activity in the coal,  $796 \times 10^6$  pCi/hr will be present in the coal going to the boiler. Because the radium will be in the particulates, we will assume 99 percent collection in the scrubber.<sup>12</sup> A level of activity of

2210 pCi/sec will be emitted to the atmosphere. Applying the diffusion model, we find a maximum value of  $9.2 \times 10^{-4}$  pCi/m<sup>3</sup> in the ambient air at ground level. The maximum permissible concentration set by the Federal Radiation Council is  $1 \times 10^{-12}$  uCi/ml or 1.0 pCi/m<sup>3</sup>, for radium in soluble form (or twice that value if insoluble). Therefore, maximum radium<sup>226</sup> concentrations are expected to be three orders of magnitude less than those values considered safe. From these figures, the Department concludes that no radiation danger is expected from the proposed power plant; however, sampling for radioactivity will be carried out once the plant goes on line to experimentally ascertain the correctness of this conclusion.

#### Other Trace Elements

A symposium on trace elements in coal was held at the annual meeting of the Geological Society of America in November, 1972. From the papers presented and the discussions which followed, several conclusions can be tentatively drawn.<sup>1</sup>

First, many trace elements are rather efficiently captured in the plant when good particulate control is in operation. From work done in Australia, it appears that in chain grate and stoker fired boilers, most of the trace elements are collected in the slag, ash, and boiler tube deposits. The boiler tube deposits immediately next to the tube have much higher concentrations of the trace elements, which may be the result of greater cooling in that zone of the deposit. In pulverized coal boilers, such as the proposed Colstrip plant will have, the trace elements collect in the fly ash. These situations hold true even for the more volatile elements such as arsenic, zinc, and lead. No information is available from this study for wet scrubber systems but if cooling is a factor in concentrating trace elements on the boiler tubes, the degree of cooling in the wet scrubber may be expected to make that system more effective in removing trace elements than other kinds of control devices.

Second, a speaker from EPA (Von Lehmden) reported that there are some indications that smaller particles have higher concentrations of the trace elements than the larger

ones. He stressed that the data only indicate the possibility of the existence of this phenomenon. If this phenomenon exists, one could not assume the same efficiency of removal of trace elements by the scrubber as the efficiency of particulate matter, since the scrubber is less efficient in removing the smaller particles. However, a concentration factor of two in the uncollected fly ash would reduce the efficiency of trace element collection from 99.5 percent (total particulate collection efficiency) to 99 percent, assuming all of the trace element is in the fly ash. Because the concentration factor in the escaping particulate matter is probably less than two, and because some of the trace elements are collected before they reach the scrubber, an efficiency of 99 percent for particulate trace element removal can be assumed if the overall particulate efficiency of the scrubber is 99.5 percent.

#### Trace Elements in the Collected Ash

Some concern has been expressed concerning the fate of the trace elements in the collected ash and if these elements can enter ground or surface water. The trace elements in the ash differ from those in the coal in two important ways. First, the burning of the coal recombines the elements into different compounds. Second, the concentrations of the trace elements in the ash may be elevated over those in the coal.

The oxidizing environment and high temperatures in the boiler are generally expected to produce oxides of the elements. Most oxides are quite insoluble and will remain in the ash. This Department is not aware of any trace element contamination existing from leaching of the coal, fly ash that is used in concrete, and other materials, or from leaching of the clinker (the ash and baked country rock resulting from natural underground coal fires.) The clinker perhaps deserves some investigation in this area because of the reducing conditions which probably existed during the combustion of that coal. In this case, the trace elements may exist in less oxidized states and be more soluble than in the power plant ash. If the leaching of trace elements does become a problem, ash disposal methods may be altered to alleviate the problem.

### Conclusion

Although many questions exist concerning possible trace element contamination from the proposed plant, no significant problems are expected at this time. This situation does not eliminate the state's concern in this area and investigations are continuing to answer some of the questions. Monitoring by the state agencies and research organizations probably would discover any problems that might arise which are not anticipated at this time. Problems related to trace elements, if found, will have to be dealt with on an individual basis.

TABLE 8

Hi-vol analyses at a site 9 miles east of Colstrip are as follows:

<u>Values are 24-hour averages in ug/m<sup>3</sup></u>	<u>No. Samples</u>	<u>High Value</u>	<u>Low Value</u>	<u>Geometric Mean</u>	<u>Arithmetic Mean</u>
Total suspended particulate	23	191	3.7	22	--
Cadmium	20	0.001	0.000	--	0.0002
Lead	20	0.011	0.000	--	0.065
Zinc	20	0.290	0.010	--	0.1235

The above heavy metal data were obtained by chemical analyses of the hi-vol fiber-glass filters.

## Possible Impacts From Emission

### Sulfur Oxides

Many of the effects of sulfur oxide emissions have been documented.<sup>4</sup> Metallic surfaces may be damaged with the damage increasing with increasing humidity and temperature. Other materials affected by  $\text{SO}_2$  are limestone, marble, roofing slate, mortar, some textile fibers, such as cotton, rayon and nylon, and leather and paper. Synergistic interactions with particulate matter contribute to the effects. Sulfur oxides can also damage various forms of plant life.<sup>4</sup>

Sulfur oxides generally accelerate corrosion when they are first converted to sulfuric acid, either in the atmosphere or on metallic surface. Tests in Chicago showed that 100 gram mild steel panels exposed to average sulfur oxide concentrations of 0.02 ppm lost about four grams of their weight through corrosion within three months.<sup>4</sup>

Plants vary in their sensitivities to sulfur oxides. Among the plants existing near Colstrip, alfalfa is believed the most sensitive to  $\text{SO}_2$ . Experiments have shown that 1.25 ppm of  $\text{SO}_2$  will cause traces of leaf destruction in one hour. Four ppm caused 50 percent leaf destruction in the same time.<sup>4</sup> It has been suggested that lower concentrations of  $\text{SO}_2$  over long periods may slow the growth rate of sensitive plants.<sup>4</sup>

There are two types of visible leaf injury, acute and chronic, associated with  $\text{SO}_2$ . Acute injury is caused by relatively high  $\text{SO}_2$  concentrations over relatively short intervals. Chronic injury results from exposure to relatively low concentrations over a period of days or weeks. It occurs when an excessive amount of sulfate accumulates in leaf tissue. Sulfate formed in leaf tissue from  $\text{SO}_2$  in the air is additive to sulfate absorbed through the roots. Absorption through the roots thus increases as  $\text{SO}_2$  in the air precipitates sulfate into the soil. It should be noted that sulfates precipitating from airborne  $\text{SO}_2$  may enrich sulfate-deficient soil. The sulfate content of soils near Colstrip is not known.

In addition to visible damage, it has been suggested that the growth of alfalfa and other sensitive species might be suppressed at  $\text{SO}_2$  concentrations too low to produce visible injury.<sup>4</sup>

Another possible source of damage from  $\text{SO}_2$  emissions results from the formation of sulfuric acid mist, the combination of airborne sulfur oxides with water. The amount of acid formed depends on the temperature, humidity, and the amount of sulfur oxides in the air.

Some types of pine trees are sensitive to sulfuric acid solutions, and substantial damage to commercial Christmas tree crops has been reported in an area dominated by the Mt. Storm power station at Mt. Storm, West Virginia.<sup>22,14</sup> Although the damage apparently was caused by acid rains, it should be noted that the Mt. Storm plant emits an estimated 120,000 tons of sulfur oxides per year, compared to about 30,000 tons at the proposed Colstrip plant.

Heavy  $\text{SO}_2$  emissions also can lead to acidification of soil and water. Studies in Scandinavia indicate that the pH of surface water in that area has extended farther into the acid range over a period of 11 years.<sup>37</sup>

The increasing acidity is believed to result from the heavy industrial pollution drifting over the area from southern England and central Europe. Sulfuric acid in precipitation is believed to cause the acidification.

While in England,  $\text{SO}_2$  concentrations declined at ground level because of the increasing use of tall stacks. However, downwind in Scandinavia the acidity of rainwater increased. It is assumed that the delivery of the pollutants to higher air levels by taller stacks caused the delivery of the pollutants to stations farther downwind than before.

In 1958, the pH of rain was between 5 and 4.5 in areas of Europe downwind from major pollution sources. One exception was the Netherlands, where the pH was lowered to 4.5 from the buildup of pollutants from southern England, northern France, and the Ruhr. Seven years later, the pH was under 4.5 over most of central Europe and southern Scandinavia, and under 4 in the Netherlands and northern Germany.<sup>37</sup> The trend to acidification apparently is increasing with industrialization.

Surface water in Scandinavia became two to three times more acid over a three-year study period. This is expected eventually to affect fish populations. Salmon can tolerate a pH no lower than 5.5, trout 5, pike 4.3, and perch 4.5<sup>7</sup> Where acidic precipitation is heavy, important minerals may be washed out of soils.<sup>25</sup>

The amount of SO<sub>2</sub> emitted from the proposed Colstrip project probably would be insignificant compared to that causing the effects noted in the Norwegian study cited. Other coal development facilities known to be under consideration in the area could lead to significant damage from SO<sub>2</sub>.<sup>29</sup>

On a worldwide basis, man is believed to be contributing about half as much as nature to the total atmospheric burden of sulfur compounds. By the year 2000 he will match nature's contribution.<sup>18</sup> In industrialized regions the SO<sub>2</sub> concentrations contributed by man are overwhelming natural processes, and causing the dispersal of sulfur compounds for many hundreds of kilometers downwind from industrial sites.

### Fluorides

According to the U. S. Department of Commerce, about 155,000 tons of man-made fluoride is emitted to the ambient air annually. Of this, 17 percent, or 27,000 tons, comes from the burning of coal.

Although the State ambient standard of 1 ppb for a 24-hour average is considered adequate, the effects of fluoride emission over the life of the proposed plant are unpredictable. Exposure to low concentrations over long periods can lead to damage in sensitive plants. In studies some plants exposed to .1 ppb for five weeks developed substantial leaf damage and accumulated 150 ppm of fluoride.<sup>30</sup>

Ponderosa pine, which is common around Colstrip, may be damaged by fumigations of hydrogen fluoride at a concentration of .5 ppb.<sup>13</sup>

Also, in some cases it appears that ambient concentrations below 1 ppb may cause fluoride concentrations in vegetation sufficient to harm domestic animals. A recent study by the Washington Department of Ecology found that an aluminum plant near Ferndale,

Washington, was causing fluoride concentrations in the ambient air of .4 ppb. Plants in the nearby area accumulated 20 to 180 ppm of fluoride, and cattle were crippled from eating contaminated forage.

Most veterinarians who have studied fluorides agree that at least 35 ppm in forage is necessary to cause harm to domestic animals.<sup>13</sup>

It should be recalled that bunch grasses growing in the Colstrip vicinity have a life cycle lasting from three to five years, allowing more than one growing season for the accumulation of fluorides.

Most studies indicate that domestic animals raised in areas not polluted by fluorides will accumulate in their lifetimes less than 1000 ppm of fluorides in their bones. In polluted areas, animals will accumulate between 1000 and 8000 ppm, depending on the severity of the pollution.

Domestic animals do not exhibit the same fluoride-accumulating propensities as wild animals.<sup>5</sup> Data published by the EPA in 1972 showed the following:

1. Indigenous animals such as mice, rabbits, squirrels, chipmunks, deer, elk, bear, antelope, coyotes, and grouse collected in areas where vegetations contain 10 ppm or less of fluoride will average less than 300 ppm in their bone tissue.
2. Animals of the same species living in a fluoride-polluted area will accumulate two to five times more fluoride in their bones than domestic animals living in the same area.
3. Deer and snowshoe hares feeding upon forage with an average fluoride concentration of 30 ppm will accumulate 2000 to 5000 ppm of fluoride in their bone tissues, while grouse species (blue and ruffed) feeding on forage with 30 ppm of fluoride will accumulate 3000 to 7000 ppm in bone tissues.

There was no attempt to evaluate health effects caused by fluorides in the wild animals.

## Particulate Matter

The extent of impacts resulting from particulate emission is not completely known. On a worldwide basis, suspended particulate matter is believed to be at least partly responsible for lowering the temperature of the planet, through the refraction of in-bound solar energy.

The most obvious impact from particulate matter emitted at Colstrip probably would be visibility. The efficiency of venturi scrubbers is known to be low on particles less than two microns.

A given mass of particulate matter, such as one pound, will refract light in the atmosphere according to the amount of surface presented to the light rays. One pound of particles 2 microns in diameter would have far more surface area, for example, than two much larger particles each having a mass of one-half pound. Thus, even the 99.5 percent efficiency predicted for the scrubbers at Colstrip will not totally prevent visibility reduction. There is reason to think that under stable conditions, with high humidity, visibility may decrease.<sup>3</sup> Visibility will decline as humidity rises.

Another contribution to lowered visibility will be the conversion of sulfur oxides and nitrogen oxides to sulfate and nitrate particles in the air.

The Southwest Energy Study commented thus on visibility reduction:

"A review of available information on conversion of  $\text{SO}_2$  and  $\text{NO}_x$  to particulate matter in plumes indicates that there is no information on conversion of  $\text{NO}_x$  to nitrate and the information on conversion of  $\text{SO}_2$  is not very reliable and is in quantitative disagreement. However, it is clear from chemical analysis of collected particulate matter that  $\text{SO}_2$  and  $\text{NO}_x$  are converted to particulate sulfate and nitrate.

"If there is significant conversion of  $\text{SO}_2$  and  $\text{NO}_x$  to particulates this will predominate over fly ash in causing visibility reductions.

"Aircraft studies in power plant plumes have reported that as much as 50 percent of the gaseous  $\text{SO}_2$  disappears (presumably to particulate sulfate or sulfuric acid) within  $\frac{1}{4}$  mile of the stack exit."

Since the abatement equipment on the proposed plant would be similar to the equipment on the Dave Johnston plant, it is germane to note that there is almost no visible particulate matter in the scrubbed stack gases of that plant.

Further possible impacts of particulate emissions will be discussed under health effects.

### Mercury

Because of the lack of any reliable analysis of mercury in the Colstrip coal and ignorance regarding the efficiency of venturi scrubbers on mercury vapor, no predictions can be made about possible effects. The movement of small amounts of mercury through the food chain may cause liver or kidney concentrations in range cattle to exceed federal tolerance limits without visible damage to the animals if mercury emissions are high enough.

A concentration of .17 ppb in water appears capable of producing levels in fish flesh of .5 ppm, which is above acceptable levels for human consumption on a regular basis.<sup>19</sup>

### Selenium

Selenium is poisonous to men and other animals in high concentrations. At lower concentrations it is a necessary dietary substance. No impact should result from selenium emissions at Colstrip, owing to the high collectability of selenium compounds in wet scrubbers.

### Impacts of Emissions in Combination, Health Effects

Although synergistic effects are certain to occur among emissions from the proposed plants, the potential for damage is impossible to assess. It is possible to assert that the combined effects of all the pollutants will be greater than the accumulated effects of each pollutant existing alone. For example, particulate matter acts with sulfur oxides to increase the irritant capabilities of the combination. A threefold to fourfold potentiation of the irritant response to sulfur dioxide is observed in the presence of particulate matter capable of oxidizing sulfur dioxide to sulfuric acid<sup>3</sup>

Both ozone and nitrogen oxide react with  $\text{SO}_2$  to cause plant damage at concentrations much lower than those needed for either pollutant to damage plants alone.<sup>4</sup>

Acting alone, nitrogen oxides are an irritant to the human respiratory system. Combined with water in the air, NO can become corrosive nitric acid.<sup>2</sup>

The team hired by the applicant to study emission effects at Colstrip indicated that some plant damage might result at Colstrip if the oxides of nitrogen are released in sufficient quantity during early summer, when plants are growing rapidly. (See Appendix)

In the human body  $\text{SO}_2$  acts to cause increased resistance in the airways of the lungs. Most individuals react to  $\text{SO}_2$  at concentrations 5 ppm and above, although sensitive persons experience discomfort at 1 ppm. The long-term effects of  $\text{SO}_2$ , particulate sulfates, and sulfuric acid mist are not agreed upon, although it generally is conceded that sulfur oxides lead to a variety of respiratory ailments.

A letter to the State from Dr. Bruce Anderson, Billings, (see Appendix) indicates that patients with respiratory ailments in Billings get noticeably worse when a temperature inversion traps pollutants.

Dr. Bruce Geer of Durango, Colorado, testified before a U. S. Senate Committee that acute and chronic respiratory ailments in children admitted to Durango hospitals doubled in five years during the operation of the Four Corners coal-fired power plant, although the population of the areas served by the hospitals decreased.<sup>23</sup> Dr. Geer attributed the increased illness to air pollution from the plant. It should be noted that the Four Corners plant emits an estimated 300 tons of  $\text{SO}_2$  daily, compared to 82 tons per day at the proposed Colstrip plant.

Nevertheless, it is interesting that emphysema and chronic bronchitis are among the fastest growing diseases in the country, doubling every five years since 1945.

The extremely small particulate matter that would be emitted at Colstrip could be more detrimental to health than larger amounts of coarser material.<sup>3</sup> This is because

microparticulate matter, smaller than 2 microns, penetrates more deeply into the air passages of the lungs, where it may hinder air exchange. Further, the smaller particles in this range may penetrate the minute air sacs of the lungs where they come into direct contact with the blood. They may then be transmitted throughout the body, along with attached toxic materials. The smaller particles also can carry more toxic material than an equal weight of larger particles because of the greater area of the smaller particles.

There also is evidence that particulate matter may increase precipitation where humidity is sufficient.<sup>23</sup>

Although humidity at Colstrip is low, it likely would be increased by emissions from evaporative cooling towers. Besides possibly increasing precipitation and decreasing visibility, increased humidity from cooling towers could cause increased generation of sulfuric acid if the cooling tower plume were to mix with the stack plume.

Such mixing of the plumes should be infrequent because of the large vertical difference of the emissions, and the probable difference in wind direction between the 65-foot level cooling tower emission and the 500-foot level of the stack plume. Despite the apparent odds against plume mixing, it does happen at existing power plants. Regardless of whether the plumes mix, the cooling towers produce a detectable increase in humidity for many miles downwind.<sup>23</sup>

Under the proper weather conditions, wet cooling towers can produce icing and fog conditions, although this usually does not extend more than one-quarter mile from the towers.<sup>26</sup> Only the power plant will be within one-quarter mile in the prevailing wind direction from the towers. The applicant indicates that the Bechtel Corporation believes fogging or icing will not occur more than 200 feet from the towers.

#### Noise

The only significant noise at Colstrip will be produced by the cooling towers. Using information furnished by the applicant, the state developed the following chart.

TABLE 9

Noise level (both towers) in db(A)	distance in feet
84	100
78	200
72	400
66	800
60	1600
54	3200
48	6400

There is no federal or state noise standard, but some Montana towns have noise ordinances. In Billings and Helena, for example, the maximum noise allowed during the day is 55 db(A), with 50 the maximum at night. From information furnished by the applicant, it appears there is a trailer park planned about 1500 feet from the towers. At that distance, the sound level might be bothersome. Even at the far side of Colstrip, about 3000 feet from the towers there will be noise in excess of the municipal ordinances for Billings and Helena. The towers will also be 3000 feet from the applicant's property line.

#### Cooling tower drift

Information from the applicant on cooling tower drift follows.

"At an expected drift loss of 0.005 percent of 104,000 GPM (5.2 gpm) the solids carryover would not exceed 10.9 pounds per hour. By analogy . . (with information furnished by Bechtel) all of the material would be deposited within a 2000 foot radius of the towers and 60 percent or 835 pounds/acre/year within a 1000 foot radius. These figures apply to continuous operation at full load, whereas actual operation would average about 70 percent of maximum."

Bechtel estimated the flora damage threshold at 1000 pounds/acre/year.

It should be noted that the 2000 foot radius is all company land.

The cooling tower water will have the following maximum composition:

Total hardness, ppm as $\text{CaCO}_3$	1,859
Calcium, ppm as $\text{CaCO}_3$	1,167
Magnesium, ppm as $\text{CaCO}_3$	682
Alkalinity, M, ppm as $\text{CaCO}_3$	32
Alkalinity, P, ppm as $\text{CaCO}_3$	0
Chloride, ppm as Cl	76
Sodium, ppm as Na	483
Silica, ppm as $\text{SiO}_2$	166
Nitrate, ppm as $\text{NO}_3$	6
Sulfate, ppm as $\text{SO}_4$	2,646
Bicarbonate, ppm as $\text{HCO}_3$	39
pH	$7.2 \pm 0.2$
Total dissolved solids, ppm	4,045

### Other impacts

#### Ash and Water Discharge to the Land

##### Dust from Ash

Fly ash, bottom ash, and economizer ash are sluiced to the ash pond system for settling. When the settled ash fills an individual pond to capacity, the water is drained off to another pond and the ash is removed.

The two possible sources of dust from this operation appear to be of only minor impact. First, dust may be generated from the surface of a dry inactive pond prior to or after ash removal. Second, dust may result from ash handling and disposal.

The applicant has indicated ponds will be kept flooded at all times, especially if it appears a dust problem may arise. The applicant has also indicated measures will be taken to reduce dust from ash handling. Data on physical properties of the ash indicate that the ash does not easily become airborne. This is especially true at the pond where it has a tendency to form a hard crust.

There is some chance of water contamination if the applicant fulfills the stated intention of disposing of ash in worked-out strip mines.<sup>29</sup> The pollution potential has not been determined, and the State Department of Lands indicates that no fill of ash into mines will be allowed until it is proven that water contamination will not occur.

### Water Contamination - Plant

The closed recycling water system prevents any wastewater discharge to ground-water or streams. All water leaving the plant is discharged directly to the atmosphere from the stack, cooling towers, and ponds. Approximately 6250 gallons per minute of water evaporate from the cooling tower-condenser system, and 500 gallons per minute leave the stack.

Blowdown, consisting of mineral-laden water from the boiler-turbine system, discharges to the ash pond. The minerals eventually are concentrated by evaporation and precipitate in the pond.

### Water Contamination - Colstrip Sewage System

An Imhoff Tank, which provides settling and removal of suspended material, is presently used for sewage treatment. On May 8, 1971, the Montana Water Pollution Control Council adopted the following compliance plan for the community of Colstrip:

Begin construction of new sewage treatment facilities by September 1, 1971.

Complete construction of new sewage treatment facilities by January 1, 1972.

Plans and specifications were received for the project during April, 1971, and after requested changes were made, they were approved on October 14, 1971. A county rural improvement district was formally established for the project during October, 1971. Construction of the sewage lagoons began during September, 1972, and was completed in January, 1973. Design of the facility was based on a projected 1990 population of 880.

Because there is essentially no flow in Armells Creek, it is necessary to have a facility which will provide removal of essentially all waste materials contributed by the population or to provide a facility which is capable of treating the sewage adequately, holding it to a time when there is adequate dilution flow in Armells Creek, and discharging it at that time. It may also be possible to discharge the treated water to the Montana Power Company cooling water ponds when they are constructed. It

is doubtful that there will be any discharge from the sewage lagoons for several years. Aeration equipment can be easily added to the lagoons if an odor problem arises or if additional treatment is required.

The State recommends that water from the sewage lagoons be used for irrigation after water is available from the pipeline. Water from the deep well, although not harmful to humans, is too highly charged with sodium salts to be used for irrigation.

A more detailed discussion of sewage disposal is presented in "Water Quality Management Interim Plan for Colstrip, Montana" prepared by the Montana State Department of Health and Environmental Sciences.

After reviewing the potential for water pollution from the ash ponds and sewage lagoon, State water pollution authorities concluded the chance of ground or surface water pollution was slight at most. Chemical-charged water will be confined in ash ponds sealed with bentonite, plastic, or whatever other material emerges as most favorable from research now being performed by the applicant.

The new sewage lagoon is adequate for 980 persons. However, according to the town plan developed for the applicant, permanent population of the town would surpass 980 in late 1973, climbing to a total permanent population of 1781 in 1975, and remaining stable until at least 1980. If all these persons live in the town, enlargement of the sewage facilities will be necessary, and the state would require this if necessary to prevent water pollution.

#### Adequacy of water supply

Colstrip currently is supplied by several shallow wells and a cistern. The supply is deemed "barely adequate" by the state. It is proposed to divert 150 gpm from a new 9000-foot deep well to municipal use. Ample water could be supplied from the pipeline that would supply the proposed plant from the Yellowstone River.

## Land Use

The construction of the proposed power plant with its associated aqueduct, transmission lines, roads, mine and so forth, represents a major change of land use. The agrarian and wildlife uses of thousands of acres will be converted into industrial use.

The plant, as proposed, will occupy an area of 1365 acres. The mine will disturb an area of approximately 2000 acres over 30 years. The aqueduct and transmission line will temporarily alter approximately 2900 acres. However, most of the area involved in the aqueduct and transmission line rights-of-way will not be out of production. Roads along these rights-of-way may permanently change the land use of about 200 acres.

The greatest land use changes may not come from the proposed activities directly, but from the greater numbers of people in the vicinity. The increased population, especially during construction, will possibly result in trailer parks, subdivisions, drive-in businesses, service stations, and many other features that will alter land use. The growth of the town of Colstrip is being planned but the increase in area will alter land use.

## Impact on Flora and Fauna

The construction of the proposed plant, the mine, stack emissions and the general increase in human activity will affect the flora and fauna. The effects would be produced in the following ways:

1. Occupation of land by other than natural habitat.
2. Presence of man-made structures.
3. Increased noise, pollution, and other factors affecting the functioning of the ecosystem.
4. Increased activity of man, including greater hunting pressure by the increased population.
5. Effects on aquatic systems by changes in quality and quantity of water.

All else being equal, the productivity of a region depends upon the amount of land area in production. The land that once supported the plants that fed deer, mice,

and birds will be used for the plant site, storage areas, settling ponds, roads, mining, and so on, and will no longer support the living organisms. Therefore, the simple destruction of habitat for other uses will decrease the biota.

The presence of man-made structures directly affects the flora and fauna. Especially to birds, these structures, including transmission lines, are physical hazards that may increase mortality rates significantly. The structures may also provide nesting sites or other accommodations for some species such as the common pigeon. The overall effect of the structures on the native species will probably be to reduce their numbers.

Although the impacts of power lines on game birds and hunting are not well known, one recent study shed some light on the subject.<sup>15</sup>

During the study, in Wisconsin, it was observed that Canada geese in normal flight never flew under power lines. No geese were known to be shot by hunters within one-quarter mile of powerlines. In spring and non-hunting periods in the fall, geese landed within one-fourth mile of powerlines, fed near them, and walked under them, suggesting that the lines hinder goose hunting in season.

Ducks were less wary of powerlines, but the wariness varied with species. Duck shooting success on a private march declined about two-thirds after a powerline crossed the area, and shooting was limited to local birds early in the season. It thus would seem that hunting might be affected if the powerlines from Colstrip were to pass through or near grainfields along the Yellowstone River. No adequate assessment can be made of environmental impact caused by powerlines and pipelines until their actual routes are known.

The noise and pollution from the proposed facility will alter the ecosystem, affecting the flora and fauna. The emissions from the plant will put a stress on some plants which may kill them or reduce their ability to compete with other species. Certain plants may be completely replaced. If such plants are essential to the survival of some animal species, a very significant change in community structure could take

place. Likewise, certain pollutants may be very toxic to some species or may interfere with their reproduction, again leading to a major change in community structure. Some other species may be favored by these changes.

The increased activity of vehicular traffic, hikers, hunters, dogs and cats will have a damaging effect upon the flora and fauna in most cases. Greater numbers of people living and working in the Colstrip area will increase the contact between man and the natural ecosystem. This increased activity will be a direct result of the proposed power plant.

The aquatic ecosystems in the area, including the Yellowstone River, will be altered in a number of ways. The diversion of water for the proposed plant will decrease the flow in the Yellowstone. The water quality will also be changed as stack emissions get into the water, and as towns increase in size producing more sewage and urban-type runoff. It is impossible to quantify these changes or predict the major changes in such activities as sport fishing.

It is impossible to determine the impact of water appropriation from the Yellowstone River until the actual volume to be used is known. The applicant has told the state that the pipeline will be 22 to 26 inches in diameter. However, documents dated December 22, 1970, and filed in the Rosebud County Courthouse in Forsyth, record that the applicant has appropriated 250 cubic feet a second, to be transported through a 60-inch pipeline. The applicant indicates the large appropriation was made because at that time it was uncertain how much water was to be needed.

As noted earlier, information on the pipeline is unavailable.

If the applicant were to use the full 250 cfs appropriated, it could have a serious effect on the Yellowstone River below the outlet, as noted in Table 10.

It should be noted that figures supplied by the Environmental Defense Fund show that 250 cfs should supply a sustained generation capacity of 9,875 megawatts. For comparison, a 24-inch pipe supplying 40.1 cfs would sustain generation of up to 1,590 megawatts. Although the applicant has disclosed no plans for more than 700

megawatts of generating capacity at Colstrip, officials of the Bonneville Power Administration have stated publicly that the applicant is considering construction of two 700-megawatt generators in addition to the development now proposed. The officials said the two additional plants would be expected to go on line in September, 1978, and September, 1979. To get the plants operable by that time, it was indicated, a decision to build would be necessary early in 1973. Such construction would require more water than could be transported in a 26-inch line.

Under Montana law, any water appropriated but not used may be appropriated by another user. Thus, if the applicant does not use the full 250 cfs, it may be appropriated by another consumer.

Considerable interest has been expressed regarding the possible construction of units three and four. The applicant has indicated that if the decision is made to build these additional units, reapplication would be made to the state, considering the increased scope of the operation.

TABLE 10

STATION	DRAINAGE AREA, MI <sup>2</sup>	MAX. FLOW cfs	MIN. FLOW cfs	AVG. FLOW cfs
Yellowstone at Billings	11,795	66,100	430	6,754
Bighorn at Bighorn	22,885	26,200	275	3,756
Tongue at Miles City	5,379	13,300	0	405
Yellowstone at Miles City	48,253	96,300	996	11,140
Powder near Locate	13,194	31,000	0	600
Yellowstone near Sidney	69,103	159,000	470	12,910

Records show that between 1931 and 1965 the lowest daily flows of the Yellowstone River at Miles City averaged 1900 cfs. During these low water periods the flow of the Tongue River and Rosebud Creek is nil or nearly so. Therefore, low flows at Forsyth also should average 1900 cfs. Thus, 250 cfs at Forsyth would represent about one-eighth of the river's total flow at low flow in an average year.

In its comments on the draft statement, the Environmental Quality Council commented on consumption of water from the River as follows:

"Assuming utilization of the total appropriation of 250 cfs, proportionate use of Yellowstone River water would range from 11% to 25% at minimum discharge levels and 2.2% of the 43-year average discharge. For those who would contend that this is an unrealistic figure because appropriations are usually far above what is actually diverted and used, the Appraisal Report on Montana-Wyoming Aqueducts lists approximately 2,350 cfs (1,700,000 acre-feet per year) of Yellowstone River water subject to development as industrial water supplies and a recent newspaper editorial written by a Bureau of Reclamation official indicates that in normal years the flow of the Yellowstone would be reduced one-third and in a dry year the flow would be reduced about one-half as a result of water diversion for industrial use.<sup>29</sup>

"The diversion of water of the magnitude discussed in the paragraph above would have effects on the water quality of the Yellowstone River in the following areas:

1. Temperature. Loss of water volume and buffering capacity would result in more erratic temperature fluctuations, higher temperature maxima and more prolonged periods of freezing, thus affecting:

- a. life histories of fish, invertebrates and aquatic plants.
- b. growth and reproductive rates of preferred and undesirable fish species, possibly giving the latter a competitive advantage and resulting in changes in
- c. relative abundance of preferred and undesirable fish species.
- d. growth rates of aquatic plants, including algae; possibly enhancing seasonal production resulting in nuisance blooms and taste and odor problems.
- e. diversity of the aquatic community.

2. Concentration of Pollutants. Most water quality management plans are based on the dilution effect afforded by the receiving waters. Once a substantial volume of dilution water is removed polluters may find themselves in a position of noncompliance with existing water quality criteria. Parameters, the concentrations or levels of which may be affected, include:

- a. coliforms.
- b. biochemical oxygen demand (BOD) and dissolved oxygen.
- c. pH
- d. turbidity.
- e. temperature.
- f. residues.
- g. sediment or settleable solids.
- h. toxic substances (pesticides and heavy metals).

In the extreme case, one or any number of these factors may increase (or decrease) in value or concentration to the point where the tolerance level of fish and bottom organisms is exceeded and community diversity is thereby reduced.

3. Concentration of Nutrients. Nutrients, particularly phosphorus, nitrogen and carbon, are critical to growth of algae and other plants which form the base of the aquatic food chain. Only slight increases

in the usable concentrations of these three strategic elements, alone or in combination, are often enough to trigger massive algal growths or blooms which could degrade the water aesthetically by causing taste and odor problems and visual unsightliness. The Yellowstone River, however, is not subject to this type of problem except where it or its confluent the Missouri may be impounded.

These are three areas where water quality would be affected by diversion away from the river. These are merely the types of problems that may arise; statements on their extent would be speculation at this time. The severity of the impact would be determined by the magnitude and timing of the withdrawal. Critical parameters should be monitored over a period of years to detect undesirable changes as development progresses and more water is appropriated, withdrawn and consumed."

The Ecological Consulting Service of Helena under contract to the applicant, is studying the possible effects.

#### Adequacy of air pollution standards

The State in its Ambient Air Quality Standards wrote

"The air quality standards listed describe a level of air quality designed to protect people from adverse effects of air pollution, and they are intended further to promote maximum comfort and enjoyment in the use of property consistent with economic and social well being of the community."

At this time, the State sees no reason to doubt the adequacy of the standards.

The EPA defines its primary standard as adequate to protect the public health to a sufficient degree. The EPA secondary standard is calculated to protect the public welfare from any known or anticipated adverse effects from pollution.

The EPA is believed to be considering new standards, and should these go into effect, provisions are available for backfitting additional pollution control equipment on the Colstrip plant, should it fall under the new standard.

For example, additional SO<sub>2</sub> removal could be accomplished by adding stages to the venturi scrubbers.

#### Social and economic impacts

The human dimension of the proposed Colstrip development is perhaps the most difficult to assess adequately. The economic aspects are somewhat more clear cut and some of the benefits of increased coal production at Colstrip can be predicted. Some of these follow:

## Tax Returns

Under present tax laws, coal using operations are subject to the following kinds of taxes and fees:

- a. Strip Coal Mines License Tax--paid quarterly to the state, based on gross value of tonnage mined, and heat content of the coal. The first 5,000 tons are exempt from taxation, and a credit of up to one cent per ton for land reclamation may be claimed, or else one-half the cost of reclamation, whichever is lower.
- b. Corporation License--paid annually to the state, based on 5.75 percent of all net income earned in the state, with a minimum of \$50.
- c. Net Proceeds--paid to the county, based on tonnage mined. Net proceeds of mines and mining claims fall in Class 1 of taxable property, taxed at 100 percent of "full and true" value. So, although it has the appearance of an advalorem property tax, this is in fact a tax on production.
- d. Property, both personal and general (land and improvements)--paid to the county. At the discretion of the Legislature and with the approval of the electorate, a statewide property tax of up to 2 mills paid to the state may also be levied.

Coal-using companies, power generating and distributing firms are subject to the Electrical Energy Producers' License Tax, amounting to 1.438 percent of the gross value of electrical sales, and to corporate income taxes as well as property levies. No taxes peculiar to coal-conversion companies have been enacted.

Rates at which these taxes are levied are based on amount of capital investment, volume and type of coal mined, or net income from operations. From partial figures on coal company operation, it appears that all taxes (not including royalty payments) paid to county and state are currently averaging about 18 cents per ton mined. The three companies on the tax rolls for the calendar year 1971 paid to the state and local governments 1 1/4 million dollars on 7 million tons mined.

For newer generation-plus-mining operations, payrolls are reported to average about \$10,000 per employee, with this income subject to state income taxes, local property and special taxes, gasoline taxes, and licenses and fees.

"Value added by manufacture" is a rough measure of the relative tax-yielding character of an industry. But the added value may be due to high capital investment in machinery and equipment, subject to property taxes; or to high investment in personnel

and payrolls, subject to income and other taxes. It cannot be assumed, of course, that increased tax returns will lead inevitably to lower taxes per capita. Rosebud County however, has already felt a sharp increase in tax returns per capita as a result of coal-based operations.

#### Employment

Jobs and population increases from coal development will depend on the number and kinds of enterprises that are established. From present evidence, the number of jobs created per million tons of coal extracted per year are about as follows:

Mining only	10 to 20, depending on scale and efficiency of operations.
Power Generation	40

#### Multipliers

The relationship between numbers of jobs and the probable general population is calculated by using "multipliers." One of these described the numbers of service and professional occupations ("derivative" jobs) that appear in an economy as a result of a given number of new primary or basic jobs. In Montana, this relationship was derived in the Montana Economic Study by the University of Montana's Bureau of Business and Economic Research in 1970, on the basis of statewide historical figures up to 1969; and the multiplier was 2.7. This meant that in general 1.7 derivative employment positions have developed for every basic job -- defined as jobs based on products or services for export, and therefore creating income to the community or state from "outside." The multiplier was not worked out for different portions of the state, however, and a study of recently acquired figures giving data by counties shows indication that this multiplier is probably lower in the eastern counties, many of them characterized by population decrease and economic decline for decades. Another multiplier is the average size of family or household -- or more accurately, the number of persons supported by each of the income-producing jobs. Use of the average household size (3.1 persons in 1970) to estimate population would give an inflated projection, because it assumes each of the jobs would be filled by a separate breadwinner and would

represent a different household. The statewide ratio of population to jobs in 1970 was about 2.8, but this ratio obscures the "true" relationship because it includes a sizeable unemployment figure, which would not be characteristic of an area with expanding job opportunities and increasing employment.

Population increase would be inevitable if coal mining increases and increased numbers of jobs and people mean social impacts of various kinds. But it must be remembered that the eastern counties have already been undergoing considerable social impact from population and employment changes during the past decades. Although not all the counties have been decreasing in total numbers of people, all but one suffered net out-migration during the past decade, and all but one are subject to an "employment-gap" amounting to between 6 and 29 percent of total 1970 employment, and averaging 15 percent for the 14 counties. This employment-gap calculation was used in the Montana Economic Study to describe the amount of additional employment growth that would have been required to prevent out-migration of the labor force. It assumes that stopping net out-migration would have required a growth in employment sufficient to absorb the entire "natural" growth of the labor force (which depends on normal population growth rates in the area) and in addition reduce the unemployment rate to the 1960 national average, which was 5.1 percent and has been both higher and lower in the interim. By this kind of calculation the "employment-gap" still to be filled in 1970 amounted to at least 4,400 jobs in the 14 counties, and probably more.

The town planners hired by the applicant predicted that the population of Colstrip would reach a maximum of 1866 in late 1974, declining in 1976 to a permanent population of 1781.

Not all of this population would work directly for the company, and many or most of them would be the non-working dependents of the workers. As shown in Table 11 the payroll for construction, mining, and operation employees would peak in December, 1974, at \$2,493,000 per month declining gradually to \$410,000 per month after October, 1976.

TABLE 11

ESTIMATED MONTHLY PAYROLL AT COLSTRIP PROJECT  
 UNITS #1 & #2  
 (THOUSANDS OF DOLLARS)

	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>
January	-	435	1241	2455	1926
February	-	482	1300	2349	1455
March	-	647	1338	2226	1220
April	-	894	1494	2119	995
May	-	1029	1648	2036	807
June	-	1205	1864	1936	589
July	423	1341	2064	1899	622
August	418	1405	2234	1852	463
September	423	1400	2346	1864	416
October	435	1305	2446	1929	410
November	465	1247	2487	1993	410
December	476	1229	2493	2011	410

based on:

Project 1972 costs - no escalation

Includes payroll estimate for construction, operation, and mining labor.

It is uncertain whether the tax benefits from the project would adequately offset the social problems that might ensue.

Few predictions can be made about the needs of the increased population. The State Department of Intergovernmental Relations believes the increased needs can be met with the increased revenues.

The Montana Board of Crime Control has developed a concept of what would be needed to enforce the law in the Colstrip area, following the influx of population. Rosebud County will require a new deputy sheriff, deputy probation officer, and secretary. A patrol car and other law enforcement equipment would bring the total estimated initial cost increase in the area to \$40,579.69.

A 25-bed hospital under construction in Forsyth is considered adequate for the increased population.

As noted above, the police protection is furnished by the county. Fire protection is the responsibility of the Western Energy Company. Ken R. White recommended construction of a fire station in Colstrip.

Two churches also were recommended. Library service will be furnished through a bookmobile from Billings.

Substantial expansion of housing was recommended, as noted in the summary of the plan furnished in the appendix.

Heavy impact will be felt in the schools at Colstrip. Currently there are nine teachers and 141 students in the Colstrip elementary school, and eight teachers and 128 students in the high school. The superintendent of the Colstrip schools indicates that mobile units will be brought in as the need is felt. Initially, it is planned to add two classrooms, a library, a cloakroom, and a lavatory, to accommodate 55 to 60 students.

Much of the housing to be developed around Colstrip will be trailer units. The Western Energy Company has requested that the state approve a 68 unit mobile home park

on the south side of Colstrip. There should be no water pollution potential from the site, as it is proposed to connect to the town sewage system. The municipal water supply also would be utilized. A considerable impact may result from the amount of grading necessary.

It is estimated that 3000 cubic yards of site grading excavation will be required, along with 16,000 yards of site grading borrow material and 9000 cubic yards of topsoil excavation. Storage and replacement of the topsoil is required. Roads in the area will be surfaced, and all disturbed areas not otherwise stabilized will be planted with grass. Drainage and surface runoff will be controlled with landscaping and culverts.

The increase of population in the area will contribute to the impacts expected from the total population increase expected, as noted earlier.

Whether this area is maintained as an attractive housing site will depend on the trend of employment at Colstrip. If as predicted, the population levels off at almost 1800 persons, the area might escape the type of blight that often afflicts temporary housing areas.

Social impacts will be caused by the gradual change of lifestyles from agricultural to industrial. Although the loss of agricultural land is regrettable, the economic impacts may offset the loss. For example, ranch workers, many of them married and with families, ordinarily earn between \$300 and \$500 per month. With greater job opportunities resulting from coal development, these same men may earn \$10,000 a year or more.

The quality of the overall development at Colstrip will depend in large part upon how diligently the applicant follows the town plan. The applicant asserts that architects have already been hired to implement the plan, which will be modified and updated to cope with changing situations.

Some impact also will be felt as subdivisions develop near the town, and as more families buy small acreages of land away from town. Some impacts already are felt on the Northern Cheyenne Indian Reservation from non-Indian workers living on tribal land, and purchasing supplies in Lame Deer. The Northern Cheyenne Indians have mixed feelings about the project. Some believe that the development will bring work to tribal members

and increase the standard of living, while others believe that increased contacts between non-Indians and Indians will be detrimental to the tribe.

#### Plans to Lessen Overall Impact

Efforts by the applicant to assess and minimize the environmental impact of the proposed plant include the financing of a number of special environmental studies, as follows:

1. Archaeological survey by the University of Montana. Completed, results in Appendix.
2. Study by Montana State University of air pollution effects on native vegetation, animals, soils in the vicinity of Colstrip. Preliminary survey results in Appendix.
3. Meteorological data collection and climatological interpretation of local weather pattern by MSU. One year's preliminary data used in diffusion modeling. Summary included in statement.
4. Air quality monitoring by the applicant.
5. Town planning for Colstrip growth by the Ken R. White Company, Denver, Colorado. Plan completed, summary in Appendix.
6. Wildlife habitat utilization in the vicinity of the generating station by the Ecological Consulting Service, Helena. In progress, preliminary survey results in the Appendix.
7. Determination of the presence of trace elements in the coal, and their disposition through combustion, by West Associates. No data yet.

All studies performed by MSU for the applicant will be available to persons with a "need to know," according to a spokesman for MSU.

IV. ADVERSE ENVIRONMENTAL EFFECT WHICH CANNOT BE AVOIDED SHOULD  
THE PROPOSED BE IMPLEMENTED



#### IV. ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

There are a number of basic operations and effects that are inherent in a coal-fired power plant of the kind proposed. The impacts of these operations and effects cannot be avoided. The following group of effects is considered unavoidable, should the plant be built:

1. The consumption of about 90 million tons of coal in 30 years.
2. The consumption of  $4.2 \times 10^9$  gallons of water per year.
3. Some air pollution--the amount of pollutants can be reduced, but not to zero.
4. Occupation of land by plant, mine, aqueduct, transmission lines, and human habitation space.
5. The adverse effects of increased population in Colstrip vicinity.
6. Change of life styles and social values as society is transformed from agrarian to industrial.
7. Aesthetic impact of facilities.

## V. ALTERNATIVES

Montana Power Company and Puget Sound Power and Light Company have decided to build a coal-fired electrical generating plant at Colstrip if given permission to do so. The Department of Health and Environmental Sciences will decide to issue or deny the permit for construction. The decisions made by all parties concerned are choices of a wide range of possible alternative actions. The proposed actions of the companies involved, are alternatives which they presumably believe will be in their best interests. Whether or not the company's chosen actions are in the best interests of the people of Montana remains to be seen. What alternatives exist to the building of this plant other than proposed?

The alternatives that may be considered, include both ones realistically applying to the proposed plant and ones involving this plant's role in the national energy configuration over a longer period of time. The kind of cooling, for instance, which may be applied to this plant, is a real alternative which can be considered at this time. Building a magnetohydrodynamics (MHD) plant instead, is not a real alternative for this plant at this time. MHD is a possible alternative to the conventional type of power plant at some point in the future. The dividing line between these types of alternatives is arbitrary.

### Real Alternatives to the Proposed Plant

The first real alternative which must be considered is that of not building a power plant. The decision to build the plant is based on meeting the "demand." "Demand" is a word that is heard a lot these days and perhaps should be discussed a bit further at this time. Demand, when discussing the use of electricity, is that amount of energy that the customers will use if it is available in the wires. To the consumer, the end of the wire is, practically speaking, an unlimited source of instant energy. As long as the voltage in the line is at the prescribed level, the consumer can extract all the

energy he needs at the moment. He cannot fill bushel measures with it to save for shortages, but neither is he limited in its use--that is until a brownout or total failure occurs. As long as the voltage is maintained in the line, the consumption of electrical energy is independent of the generating capacity at the power plant. Increasing generating capacity alone will not sell more power. However, if inadequate generating capacity exists, brownouts or failures will occur. Since brownouts have not occurred in Montana in the recent past, the growth of the demand is independent of the power companies except that attributable to their extensive advertising. (Even though Montana Power Company claims that their advertising does not increase the demand, this claim must be seriously doubted due to the large advertising budget of the company. They claim that the yard lights which they have promoted for years only serve to even the load during the 24-hour day.<sup>20</sup> Again, this argument can be questioned since such devices as timers on electric water heaters, which are used by other utility companies across the nation, are neither promoted nor available from Montana Power Company. Such timers would be more effective in balancing the load than the increased use of yard lights.) The decision to build a new power plant is a decision to continue to meet the demand. Unfortunately, if the demand on a particular line is not met, all of the users suffer the brownout--there are no preferred or established customers if they are supplied by the same wire.

The applicant has based their decision to construct on projected demands. According to the Bonneville Power Administration, (BPA), the rate of electrical energy use in Montana increases about five percent per year. Elsewhere, the growth rate is about seven percent, which causes a doubling of demand every ten years.

Figures from the National Power Survey, cited by the applicant, projected a demand increase from 1,460 mw in 1970 to 2,590 mw in 1980, in the area comprising Butte, Anaconda, Billings, Helena, Great Falls, Kalispell, and Missoula. The projection for 1990 in the same area is 4,700 mw. These power levels are peak loads, and are not entirely supplied by the applicant.

The applicant asserts it has had a deficiency in self-generated power in recent years. The applicant claims its self-generated resources in January, 1973, totaled 768 mw. An additional 263 mw were received from other utility sources.

In the opinion of the applicant, many of these other sources no longer will be available in 1975. The predicted 1975 peak load in the applicant's supply area is 1098 mw. The applicant asserts that brownouts could occur in 1975 if the proposed plants were not built, because the 768 mw capacity could not meet the predicted 1098 peak load.

A variety of new loads is predicted to contribute to the increased power demand. For example, U. S. Plywood and Champion International Paper is expected to need an unspecified but "significant" increase in power for expanded activities in about 1974. The Anaconda Company will need 25 mw for its new Anaconda smelter by 1975, the applicant states.

Further information from the applicant indicates that residential usage of electricity accounted for only about 20 percent of the total MPC output in 1972.

The applicant continues:

"Several signs of growth, such as population growth, rise in the living standard, rise in recreation and tourism and employment for Montana in the decade 1970-1980, are evidence of the continued growing need for electrical energy in Montana for both residential and industrial use.

"Secondly, in addition to the projection of more people and industry in Montana which will require more energy, the present market of electric energy is not exhausted. For example, only 75 percent of Montana's potential residential customers have electric ranges, only 60 percent have electric dryers, only 14 percent have outdoor lights, and only 9 percent have air conditioning. The percentage of customer growth has been the highest in history in the past two years for the Montana Power Company and is expected to continue."

One source of increased electrical demand is the farmer, who has found it feasible to place more acres under cultivation with the use of electrical sprinkler irrigation. The following is the annual added usage for irrigation purposes, from Montana Power Company information:

<u>Year</u>	<u>Horsepower Added</u>
1961	1380
1962	1333
1963	1622
1964	2163
1965	2042
1966	1643
1967	2767
1968	2582
1969	2081
1970	2743
1971	4643
1972	4292

It is predicted that the amount of energy used for environmental improvement on a national basis will increase from about two percent of total energy consumption in 1970 to four or five percent in the period 1970-1985.

The applicant indicates that sewage and water treatment facilities in Billings and Great Falls each will use enough electricity to serve an average Montana town with a population of 10,000.

Further information from the applicant notes that the Humble Oil Company in Billings has a water treatment system using four 50 HP electric motors on large aerators in the ameliorating process.

"Great Western Sugar Company in Billings is constructing a new sewage treatment facility that will require 600 to 700 HP in electrical load. Furthermore, the air pollution equipment to be installed in the Colstrip plant will use approximately 25 mw. . .approximately 1/30 of the total electricity now generated by the Montana Power Company."

Although the applicant states that only 1,483 homes are electrically heated in the MPC service area, peak loads occur in the winter. The stated reason for this is

"because the temperature is colder and the days are shorter which results in greater uses of electricity. For example, with shorter days more lighting is required. With shorter days and colder weather there is a tendency for people to be indoors and use more electricity for lighting, clothes drying, hot water and heating. In addition to electric heat, forced air and natural gas heating systems use electric thermostats, fans and blowers."

Montana Power Company peak loads are illustrated in Figures 10 and 11 and Table 12.

# THE MONTANA POWER COMPANY ELECTRIC LOAD PEAKS and AVERAGE

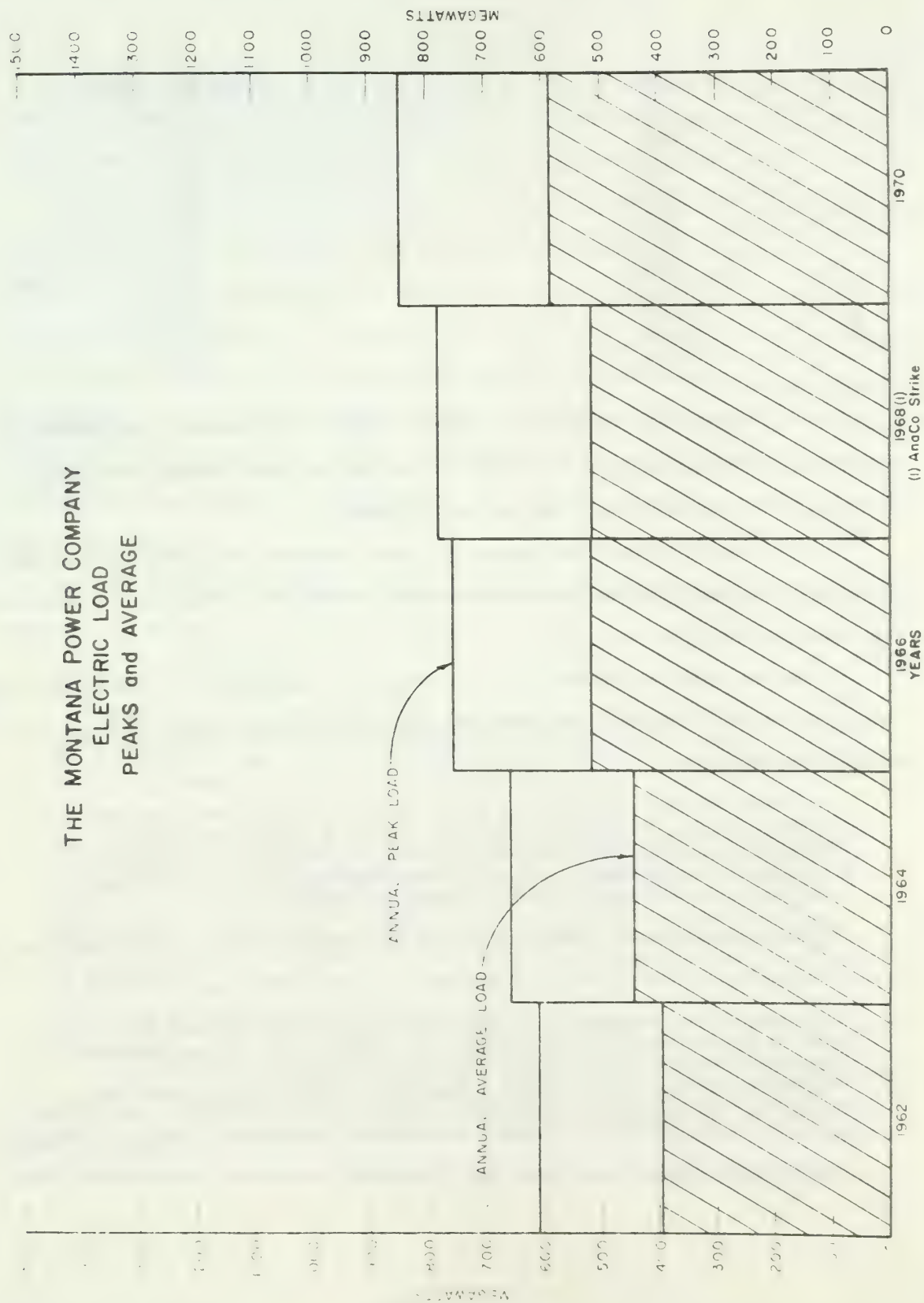


FIGURE 10

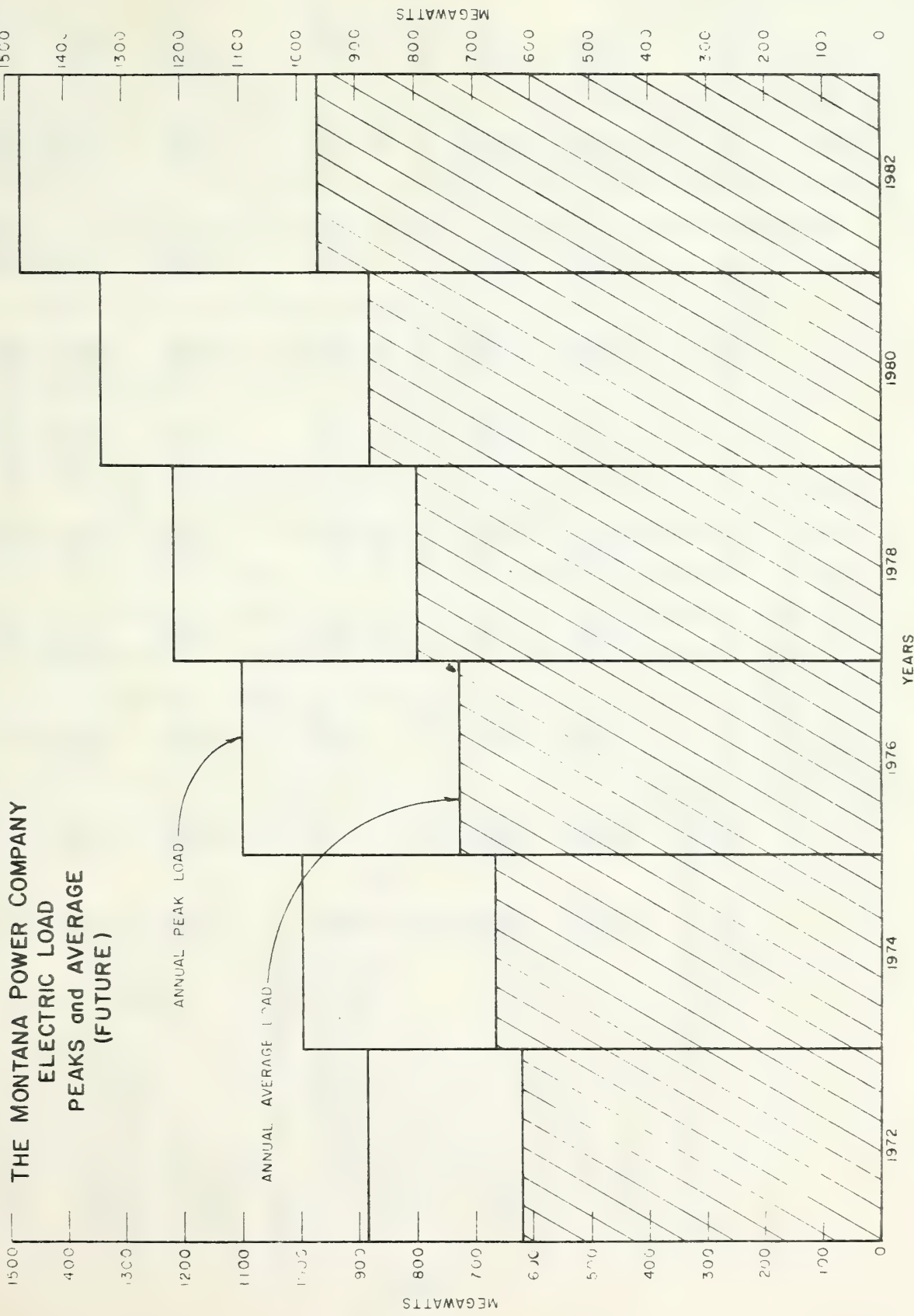


FIGURE 11

Montana-Puget Combined

Loads, Resources and Deficiency  
Megawatts

PEAK (Energy required at time of heaviest load)

	1972-3	1973-4	1974-5	1975-6	1976-7	1977-8	1978-9	1979-80	1980-1	1981-2
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Firm Load:

Montana	822	879	926	972	1020	1071	1125	1182	1241	1304
Puget	2022	2175	2341	2514	2719	2937	3177	3423	3716	4018
Total	2844	3054	3267	3486	3739	4008	4302	4605	4957	5322

Net Resources:

Montana	941	874	940	877	774	774	774	767	811	811
Puget	2052	2151	2184	2430	2438	2465	2605	2542	2387	2373
Total	2993	3025	3124	3307	3212	3239	3379	3309	3198	3184

Net Surplus (Def)

	149	(29)	(143)	(179)	(527)	(769)	(923)	(1296)	(1759)	(2138)
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Colstrip #1 & #2

Less Added Reserve Ob-

ligation

Surplus (Deficiency)	149	(29)	(143)	(101)	-99	-99	-99	-99	-99	-99
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ENERGY - 12 mos. annual average

Firm Load:

Montana	567	598	629	661	693	726	760	798	837	878
Puget	1210	1270	1363	1464	1576	1701	1836	1980	2139	2315
Total	1777	1868	1992	2125	2269	2427	2596	2778	2976	3193

Net Resources:

Montana	613	622	663	616	573	596	597	598	657	665
Puget	1210	1338	1280	1375	1315	1350	1399	1344	1282	1272
Total	1823	1960	1943	1991	1888	1946	1996	1942	1939	1937

Net Surplus (Def)

	46	92	(49)	(134)	(381)	(481)	(600)	(836)	(1037)	(1256)
--	----	----	------	-------	-------	-------	-------	-------	--------	--------

Colstrip #1 & #2

Surplus (Deficiency)	46	92	(49)	146	180	80	561	561	561	561
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TABLE 12

As noted, at least half the power generated will be delivered to the Northwest Power Pool, which serves Washington, Oregon, Idaho, western Montana, and other areas in the western U. S. through inter-ties with other pools. The BPA has testified at length on the probable need for power increases in the area served by the Northwest Power Pool.

The BPA indicates that the aluminum industry is the single largest power consumer in the Northwest. In 1970, the industry used about 21 billion kilowatt hours of electricity in the region. Individual plant use varied from 1.25 billion kwh to 3.5 billion kwh.<sup>35</sup>

The second largest industrial use is paper manufacturing with 45 pulp and paper plants in the Northwest. No specific data was immediately available on power usage by these plants, although some individual plants are known to demand almost 100 mw. The BPA estimates that pulp and paper plants account for 15 percent of the industrial use of electrical energy in the region. The third largest industrial user is the forest products industry, using over three billion kwh annually.

The following table (Table 13) from the BPA shows electric energy use by the West Group Area of the Northwest Power Pool for calendar 1970 and the percent of total electric energy use for each class compared to these same percentages for the U. S.

TABLE 13

<u>Class of Consumer</u>	<u>Pacific Northwest</u>		<u>U. S.</u>
	<u>Energy Sales (billions of kwh)</u>	<u>% of Total Energy Sales</u>	<u>% of Total Energy Sales</u>
Domestic	27.5	31.4	31.9
Commercial	12.1	13.8	22.4
Industrial	44.1	50.3	41.4
Irrigation	2.6	2.9	(
Other	<u>1.4</u>	<u>1.6</u>	( 4.3
TOTALS	87.7	100.0	100.0

Electric Power Requirements by Major  
Consumer Categories in the Pacific Northwest  
(West Group Area)

	Actual			Estimated	
	<u>1950</u>	<u>1960</u>	<u>1970</u>	<u>1980</u>	<u>1990</u>
Population <sup>1</sup>					
No. Domestic Consumers	4,674,671	5,489,729	6,435,000	7,201,000	8,476,000
No. Commercial Consumers	1,072,628	1,406,903	1,985,569	2,451,000	3,066,000
	140,401	176,807	241,860	314,000	399,000
KWH Per Consumer					
Domestic	5,112	9,841	13,831	19,300	24,600
Commercial	16,799	29,143	50,035	72,600	95,900
Energy Sales (billions of kwh)					
Domestic	5.5	13.8	27.5	47.3	75.4
Commercial	2.4	5.2	12.1	22.8	38.3
Industrial	11.1	22.3	44.1	73.0	117.0
Irrigation	.1	1.0	2.6	5.0	9.0
Other	.6	.8	11.4	2.6	4.9
Total	19.7	43.1	87.7	150.7	244.6
Losses	3.1	4.7	9.6	15.1	24.2
Total Requirements	22.8	47.8	97.3	165.8	268.8
Ten Year Annual Growth Rates	7.7%	7.5%	5.5%	4.9%	

<sup>1</sup>States of Washington, Oregon, Idaho, and western Montana.

BPA - Branch of Power Requirements  
July 13, 1972

TABLE 14

PACIFIC NORTHWEST (West Group Area) ELECTRIC UTILITY SALES

(billions kwh)

<u>Year</u>	<u>Total</u>	<u>Industry</u>	<u>Industry % of total</u>	<u>Sales to Aluminum</u>		<u>Industry Total</u>	<u>Total</u>	<u>Industry</u>
				<u>BPA</u>	<u>Chelan</u>			
1950	19.7	11.1	56.3%	6.2	--	6.2	31.5%	55.8%
1960	43.1	22.3	51.7	8.8	.1	8.9	20.6	39.9
1970	87.7	44.1	50.3	20.9	1.3	22.2	25.3	50.3
1980	150.7	73.0	48.4	31.2	1.3	32.5	21.5	44.5
1990	244.6	117.0	47.8	37.0	1.3	38.3	15.6	32.7

Branch of Power Requirements

January 10, 1973

TABLE 15

The West Group area includes Washington, Oregon, Idaho, and the portion of Montana west of the Continental Divide.

Table 14 and Table 15 further illustrate power demand projections in the Northwest.

According to BPA, a significant portion of the energy to be needed in the Northwest will be used for environmental clean up. For example, one pulp mill recently requested 7.5 mw for pollution control. If all 45 pulp plants required a similar amount of power, the demand would be considerable. BPA apparently does not agree with the applicant about the potential for large energy demand by sewage treatment, solid waste disposal and recycling processes. According to the BPA, such operations are "not large consumers of electric power."

Electrical heating units in the power pool region used about nine billion kwh in 1970 or 30 percent of the total residential electric energy use, according to the BPA. Usage of electric heat is expected to triple in the next 20 years "as shortages of fossil fuels and concern for a clean environment in the home and in urban areas accelerate demand."

No estimate was available as to possible increases in electric heating in Montana. However, MPC Executive Vice-President J. A. McElwain stated before the Board of Health on January 12, 1973, that his company does not advertise electric heat because "it's just not practical in Montana."

One BPA official has written a paper on the needs of the Northwest for more power.

After detailing many reasons for the need, he summarized:

"We are, in other words, building an affluent society (provided, of course, there is enough power for industry and commerce to create the necessary jobs and income) which will make it possible for the average consumer not only to purchase new homes and appliances, but to replace older appliances with newer ones which generally require more electricity."<sup>9</sup>

If an ever increasing demand for electricity is to be met in Montana, more generating capacity must be built. The no-build alternative means either the demand will not be met or the growth of the demand must be curbed. To stop the growth of the demand by 1975 would require a number of imaginative, bold, and unpopular steps by the

State, or, even less likely, attitude changes by society. Although it is felt by some that the growth of this demand must and will be slowed in the future, its occurrence in Montana within two years seems highly unlikely. The quickest manner in which this slowing could be brought about would be in rationing or taxing the price of power to limit the growth of the use of electricity. The increased cost would tend to cause customers to shift to other sources of energy or do without.<sup>24</sup> The political climate in Montana at this time places real limits on how far the State could proceed in this direction.

It can, therefore, be concluded that the no-build alternative is not feasible for this particular power plant.

Another real alternative involves the method of condensing the steam. Several methods can be used for this function, but since there is no large stream of water near the plant, once-through cooling can be ruled out as a real alternative. Even though the company has elected to install wet cooling towers, dry cooling is a possible choice that may be in the best interests of Montana. The State does not have adequate data to determine which is better at this time. The company claims that dry cooling is less efficient than wet cooling and will result in greater use of coal for the same power. This claim may or may not be true, but even if true, society may decide at some future time that the water is more valuable than the extra coal that would be burned. Another claim for wet cooling is that dry cooling is much more expensive; however, there are indications that if many power plants are built in Montana and Wyoming, it will be cheaper for society at large to insist upon dry cooling.<sup>29</sup> The ultimate decision on which method would be best for Montana would require extensive study. These studies have not been carried out to date, because until March, 1973, the State has not had the authority to affect any decisions on this subject and it still cannot affect decisions on this proposed plant.

The proposed plant will employ a venturi scrubber to remove particulate matter and gases from the stack effluent. Alternative collection devices exist and are in use

in other power plants. The most widely applied air pollution control unit for power plants in recent years is the electrostatic precipitator (ESP). The Corette plant in Billings, for instance, uses an ESP. Although ESP's can remove up to 99.5 percent of the particulate matter, they cannot remove gases. The venturi scrubber will remove a significant amount of  $\text{SO}_2$  and gaseous fluorides which would otherwise be emitted into the atmosphere. This Department believes that the best available control technology is planned for the Colstrip plant.

The location and size of the proposed plant is also subject to alternatives. The State does not have the authority to insist upon possible changes in these factors for this plant (future plants will come under the jurisdiction of the newly enacted siting authority). As shown above, the size of the plant by itself will not change consumption patterns unless it is inadequate. The size of the plant is then a moot point. As to the best location, no study by the state has been done on this aspect. There are many places in the state that would be a worse location for the plant, but whether better locations exist is not known. The location of future plants will be considered by the State.

The demand for electrical power could possibly be met by a generating facility utilizing some method other than a conventional coal-fired boiler. Other forms of fossil fuel are more limited than coal and would not be acceptable from several environmental aspects. Nuclear plants require a long lead time for design and construction. Substituting a fission plant for coal is not feasible if the 1975 demand is to be met; therefore, is not an acceptable alternative to this particular plant.

This discussion on "real" alternatives is not meant as an excuse to build the plant as proposed. With the authority that the Department has over this particular plant, the alternatives which really exist are voluntary ones. Decisions on these alternatives will not be entirely up to the company for future power plants in Montana.

### Long Term Alternatives

Many people are concerned about the exponential growth of electrical demand in the U. S. There exists a very definite limit (measured in decades) to the extent that this demand can grow and be met with fossil fuel. Effort should be expended to reduce the energy demand and to find alternate ways of generating power other than the burning of fossil fuels. These alternatives are longer term than those which are real for the proposed Colstrip plant. The reader is referred to Mr. Albert Melcher's discussion of alternatives in the Appendix.

## VI. RELATIONSHIP BETWEEN LOCAL SHORT TERM USES OF MAN'S ENVIRONMENT AND LONG TERM EFFECTS

Our society's dependence upon electrical energy is growing rapidly. A form of energy developed in less than a century is now used in so many ways in the domestic, industrial, and commercial sectors of our society that our way of life is dependent upon it. The technological and economic changes of this century have been so dependent upon electricity that this form of energy is considered by many as essential to civilization. Others argue that civilizations have existed for many times as long as has electrical energy production and there is little indication that this society is more civilized than ones gone before. Even in existing societies, it is contended that there is no relationship between electrical power consumption and degree of civilization.

The rapid growth of electrical energy consumption in the U. S. at this time is an indication of our dependence on this commodity. This "demand" for electrical energy, and many question whether this is a real or artificially stimulated demand, is presently being met largely by the consumption of non-renewable resources: coal, oil, and gas. This "demand" is presently growing in such a manner that consumption doubles roughly every ten years. This kind of growth is referred to as exponential. At this rate of growth, the "demand" in just three decades will be eight times its present value. Because coal is being used to produce much of this energy, the consumption of this non-renewable resource is also growing exponentially. Although there are large quantities of coal still in the earth, there is considerably less than has been expressed by some. Global reserves are estimated to be  $5 \times 10^{12}$  tons or a 2300-year supply at current rates of consumption. However, at a growth rate of 4.1 percent annually (much less than the growth rate of electrical "demand") there is only a 111-year supply. Even if there is actually five times as much coal as estimated, the supply is only 150 years at a growth rate of 4.1 percent. In addition, the U. S. has about 32 percent of the world supply but presently consumes 44 percent of the world production. (Limits to Growth, Meadows, 1972, Universe Books, New York.) Therefore, if the

electrical "demand" continues to grow at its present rate and this growth is met largely by the conversion of coal, the coal reserves in the U. S. will be greatly diminished in a few decades. The coal, once consumed in a power plant, is lost forever. Future uses of the coal, whether to generate power or as a source of chemicals for production of some other commodity, are denied. The future needs of the coal may be more urgent than our present needs for electricity.

The proposed Colstrip generating plant will not consume the reserves in Montana by itself, but it cannot be divorced from the overall energy situation of the country. (The expressed purpose of the plant makes this point clear.) At present, coal is being removed from the area for power production outside of the Fort Union Region and more power plants are being planned within the Region.

Depletion of coal as a resource is not the only long term consideration involved here. An economy based on the exploitation of the coal is developed in the coal fields themselves, as well as where the electrical energy is being consumed. The short term gains to the Colstrip area are made known by the interests involved in building the plant and mining the coal. Jobs are created and money enters the local economy from these jobs. As long as the coal is mined and the power is generated, the flow of money through the community is assured. When the coal is exhausted, or its use for production of electricity becomes obsolete, the economy and way of life dependent upon the exploitation of the coal will suffer. Many feel that this consequence is inevitable; that only its magnitude and timing are in question. Improper reclamation of the land may destroy the original economic base of the region: the land used for agriculture. Numerous examples of boom and bust cycles can be cited. There is little evidence that this sort of thing will not happen in the Fort Union Region.

At the other end of the transmission lines, is a society and economy becoming more and more dependent upon electricity. Not only is the percapita use of electrical energy increasing, but the number of persons kept employed, warmed, and fed by this energy is increasing. Each ton of coal that is used to meet the increased "demand"

of electrical energy is increasing the entire society's economic and physical dependence upon electricity. A civil disturbance or war or other sudden interruption of the supply of electricity would be catastrophic. Likewise, a sharp rise in the cost of electricity would put a strain on the economy through businesses, manufacturing, and domestic use. This situation is true today but will be more critical as time goes by and our society becomes more and more dependent upon this energy.

The possible local destruction and regional degradation of the ecosystem by the proposed Colstrip plant also has long term implications. Land use changes adversely affecting food production, modification or loss of recreational areas for present and future generations, and changes in natural species may be more significant to our descendants than our use of electricity over the next several decades. Residents of the area will be subjected to changes in social and psychological pressures from this industrial economy and life style, as the change is made from an agricultural base to a more industrial one. Future residents may encounter the reverse situation; that is, adapting to an agrarian life style should the industrial form be removed or altered.

On the more positive side, one can speculate that both short term uses and long term uses will be beneficial. The short term, while the coal supply lasts and through the life of plant operation, will see increased employment in the Colstrip and Fort Union area, and at the receiving end of the electricity. The tax base for the communities will also increase. Over a longer period, the increased employment resulting from the short term energy use may continue indefinitely, even though coal is no longer available for power generation. Alternate energy sources will probably emerge as economics dictate their practicality. It is even possible, although not probable, that some of these sources may locate in the Colstrip-Fort Union Region, where water supply and transmission systems will already exist. On reclamation of strip mined land, and possibly obsolete power plant sites, it would appear that society's increasing environmental concern will move to disallow any but the most advanced reclamation methods for the time. It is not inconceivable that reclaimed land can be returned to its

former levels of productivity. Still on the positive, it can be argued that man continues to accept new challenges as they arise and often prevails, minimizing negative consequences. Few dispute that electricity benefits society, and that a major reduction in per capita energy available would be detrimental. Evaluation of these and other potential consequences, be they boon or bane, is nearly impossible. The factual information necessary to make such determinations is, at best, scarce and few people are willing to make judgments of the relative desirabilities of such alternatives for the future.

The relationship between the short term effects and long term effects is one of space and time. It is so much easier to plan for the short term than for the long term. The effects that occur in the long term are seldom planned or taken into consideration in planning. The long term effects, both good and bad, of the Colstrip plant will be accidents, in that they are not planned. One's concern is greatest for things and persons closest to him in space and time. As situations are removed in time (future) or involve a larger portion of the world, a person spends less time and energy thinking about them. For instance, a person is much more concerned with his family over the next few years than with the nation over the next hundred years. (Limits to Growth, op. cit.) Actions based upon these different levels of concern are often contradictory. It is also much easier to accept decisions that have more personal and quicker results than ones less personal and farther removed in time. It is, therefore, easier to decide in favor of a power plant that will prevent a small power shortage in one's own town in four years than to be concerned with the fate of a large portion of the United States society fifty years from now. Even though some very serious problems for mankind seem to loom in the future if he continues on his present course, he is reluctant to give up his immediate comforts. This concept is well illustrated by our attitude towards energy in this society. When evaluated at some future date, the proposed Colstrip plant may prove to have been very efficient at solving one immediate problem, but in doing so having created other problems of much greater scope and duration.

## VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF NATURAL AND ECONOMIC RESOURCES

The consumption of a non-renewable resource is an irreversible commitment. The burning of coal in the proposed power plant would be the major consumption of a non-renewable resource. Approximately 90 million tons will be burned in 30 years, which represents the coal under nearly 2000 acres if present mining methods are used.

Since this coal will be mined by stripping, 2000 acres of land will be disturbed which will put it out of production at least temporarily. If adequate reclamation is not possible, the 2000 acres of land will be permanently degraded.

There are also some of the materials that will be used in the construction of the plant itself plus the aqueduct and transmission lines. Metals and other materials that can be recycled do not fall into this category.

VIII. RESPONSE TO THE DRAFT STATEMENT



# VIII. RESPONSE TO THE DRAFT STATEMENT

The Department of Health and Environmental Sciences has received over 3000 responses concerning the Colstrip power plant and general coal development since publication of the draft statement in October. Included in these responses were specific comments on the impact statement. The mail consisted of letters, postcards, petitions for and against development, and coupons from the Billings Gazette which express disfavor with the development.

Approximately 95 percent of the responses opposed development of the plant and coal mining operations. A breakdown of the mail as of January 4, 1973, concerning the proposed plant and coal development follows:

## For the plant or coal development:

Letters	73
Postcards	3
Signatures on Petitions	<u>54</u>
Total	130

## Against the plant or coal development:

Letters	1162
Postcards	55
Coupons	300
Signatures on Petitions	<u>1350</u>
Total	2867

A rush of correspondence arrived in late November and early December, which was probably precipitated by several articles in the Billings Gazette, including a front page editorial. Very few letters were received after January 4, 1973, and their change on the total figures presented above would be very minor.

Ranchers, doctors, lawyers, housewives, students, small town and urban dwellers, businessmen, retired persons and many more have written. Most of the writers were from eastern Montana, but included residents from other parts of this state and other states.

The fears most often expressed were:

1. Strip mining will proceed with little, if any, adequate reclamation of the land.
2. Air and water will be polluted significantly.
3. Large scale water consumption will result.
4. Montana will emulate the bad characteristics of other states.
5. Present life styles will be disrupted.

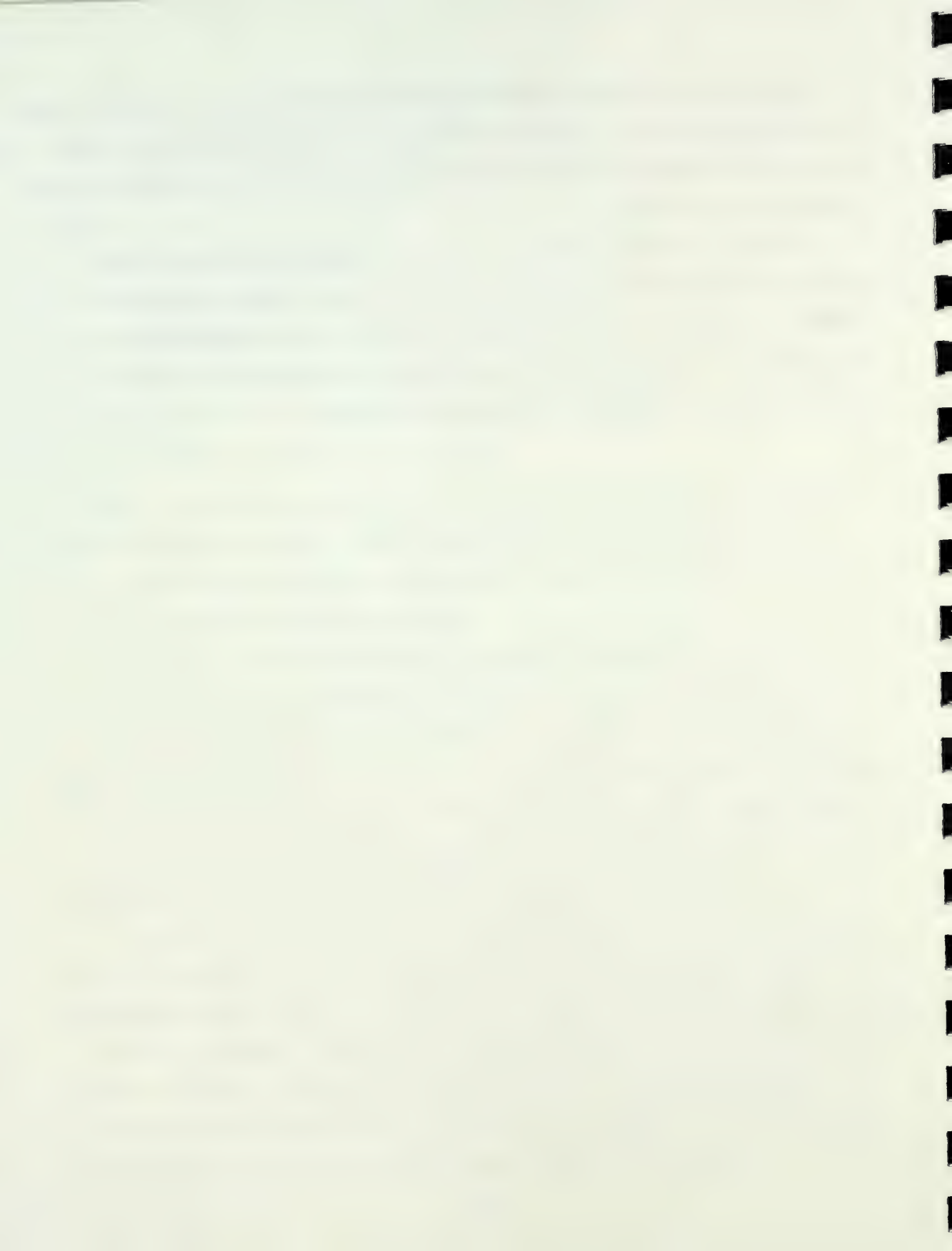
Many letters expressed disfavor with either Montana Power Company in general or with the population centers outside of Montana that would use some of the energy. Many letters and all of the coupons merely ask us to deny the permit for construction without any particular reason being stated.

There were two major misconceptions expressed or implied by the large number of correspondents. First, many people appear to believe that all of the power from the Colstrip plant will be used outside of Montana, and that Montana needs no additional generating capacity to meet its own needs. Second, most letters were written seemingly with the belief that the Air Quality Bureau could decide to issue or deny a permit on the basis of popular opinion or criteria other than the standards established in the regulations. The articles in the Gazette promoted this misconception.

There was a substantial amount of confusion expressed in the letters about the role of the Department of Health. The non-degradation clause from the Air Quality Implementation Plan was cited as evidence that the State should oppose construction of the plant. However, since in its literal interpretation, non-degradation is not possible, and since at the national level, the legality of non-degradation laws and variations thereof is before the U. S. Supreme Court, the Department does not feel it has the authority to enforce a literal interpretation of non-degradation.

There was also considerable concern as to why construction of the plant was allowed to begin before a permit to construct was issued. The reason is that the State had no authority to regulate construction except for those portions of the plant that would contribute to air pollution.

All letters commenting directly on the draft statement are included in the Appendix, either verbatim or condensed form. One of these comments worth noting states that all the great civilizations of the past became more technologically complex as they advanced. It was further noted that the great civilizations of the past also share the common characteristic of no longer being around.



## A P P E N D I X



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## ARCHAEOLOGICAL SURVEY



## ARCHAEOLOGICAL SURVEY

The following is from an archaeological survey performed in 1971 for the Western Energy Company by Dale E. Fredlund and his team from the University of Montana.

### Site Descriptions

Ellison Petroglyph Site (24RB1019). Site 24RB1019 is a rock art site located in the southwest quarter of Sec. 29, T2N, R41E. Four panels of petroglyphs (Figs. 2-5) have been drawn on the northeast vertical face of a stump-like, 25-30 foot high, eroded sandstone remnant that juts up at the end of a pine-covered ridge. Site 24RB1020, a habitation and lookout site, surround the art panels. The two sites, although adjacent, were assigned separate numbers because there is no way of ascertaining any direct association between the inhabitants of 24RB1020 and the individuals responsible for the art work at 24RB1019.

The four panels cover completely a flat, vertical sandstone face approximately 8 feet in height by 15 feet in width, but vary among themselves as to their individual dimensions and height above the present ground surface. Panel 1 covers an area approximately 4 by 2 feet (8 square feet) and is 4 to 8 feet above the surface. Panel 2 is also 4 by 2 feet (8 square feet), but covers an area from 3 to 7 feet above the surface. Panel 3 is smaller, being only 2 by 2 feet (4 square feet), and is at a height of from 4 to 8 feet above the ground. Panel 4 is 2½ feet by 1 foot, and is the lowest of the panels, being at a height of only 0 (surface) to 1½ feet. In addition, one large sandstone boulder, which had fallen face-down from the sandstone wall within the past 10 years, was reported to have exhibited numerous figures. It was impossible to move the boulder in order to verify the lead, but it seems reasonable that the report is valid.

Many motifs are still clearly visible on the panels, despite damage due to weathering. Based on the superimposition of some of the figures and on the various

art elements present, it seems very likely that more than one group of people were responsible for this art work. Grooves, lines, and various human and animal figures have been etched and rubbed into the soft sandstone.

Art styles frequently found throughout the Northern Plains occur in Panels 1-3, as follows: 7 shield-bearing warriors; 3 V-necked anthropomorphs, 2 solid body, square-shouldered anthropomorphs; 3 outlines, square-shouldered anthropomorphs; 2 horses with feathered arrows in their backs; 1 tipi; and numerous lines and arrows.

Superimposition occurs on all three panels, but the following should be noted especially: the lines dissecting the V-necked, outlined shield bearer and the square-shouldered anthropomorph in Panel 1 are etched over the figures; the V-shouldered anthropomorph occurs over an incomplete circular design on Panel 2; and a V-shouldered figure is superimposed on a square-shouldered figure in Panel 3.

Art elements similar to those in Panels 1-3 occur at the following sites, as noted by Conner and Conner (1971-17):

- Pictograph Cave, pictographs (Mulloy 1958)
- Pryor Creek, No. 2, pictographs
- Bear Gulch, pictographs (Secrist 1960)
- Atherton Canyon, pictographs (Secrist 1960)
- Decker Site, petroglyphs
- Deer Medicine Rocks, petroglyphs
- Nordstrom-Bowen, petroglyphs (Hagen 1963)
- Langman Petroglyphs, petroglyphs

In addition, several other sites in the area of Colstrip display these art forms, especially 24RB1027, the Benjamin Hill site, located near the Western Energy survey area on Rosebud Creek.

While the elements on Panels 1, 2, and 3 are fairly common in the Northern Plains, Panel 4 is atypical. The style present is, to my knowledge, not reported from any other site in the state. The art work on Panel 4 (Fig. 5) consists of frequently connecting curved lines, and rotund heads with short "crew-cut" like hair and smiling faces. The low height of this panel above the present ground surface (1½ feet) and the advanced stage of its decomposition suggest that it was

the work of a different and earlier group of people than those who were responsible for Panels 1-3. A test pit was excavated below this panel; however, fallen sandstone blocks have sealed off any information which might be gained from the site (see 24RB1020 for the test report).

Ellison Rock Site (24RB1020). Site 24RB1020 is a habitation site which extends 100 yards upslope and away from the sandstone remnant exhibiting the petroglyphs of 24RB1019. The site also includes a high sandstone remnant which had been used prehistorically as a lookout site.

The ridge is covered by native grasses, prickly pear, sage, and sparse ponderosa pines. Various types of brush grow along the bottom of an adjacent dry wash which contains water for at least part of the year.

Three artifacts were found on the surface of the site: a small side-notched projectile point, and two granite-tempered, dark gray plain ware pottery sherds. A small test pit was dug at the base of the sandstone remnant under the rock art panels. The top level of the revealed strata was 2-6 inches deep and consisted of dry, wind-blown sand and surface duff. Below this stratum was a stratum of gray sand which extended to bedrock, at a depth of 19 inches below the surface. The sand stratum was composed of compacted sandy soil and sandstone fragments with scattered charcoal, and evidenced much rodent activity. From the test pit were recovered one projectile point, three scrapers and the remnants of a hearth.

The projectile point is a small side-notched type, 2.6 cm. long by 1.2 cm. wide by 0.3 cm. thick. One of the blade edges is straight, the other convex. Of the three scrapers, two are flake scrapers, both exhibiting fine pressure retouch on one edge only. One scraper is a plano convex end-scraper of tan chalcedony. This scraper is very well made and exhibits controlled primary percussion scars on the dorsal surface. Pressure retouch is evident along the lateral edges and nose of the scraper. Part of one hearth made of fragmented sandstone rock was found resting on the sandstone bedrock. It did not contain sufficient carbon for radiocarbon dating.

Farley Ridge Site (24RB1022). Site 24RB1022 is located slightly northwest of the Farley ranch building, along the base of a low sandstone outcrop ridge that extends into the basin. Small concentrations of debitage are found intermittently from the base of the sandstone ridge to its junction with the higher pine-covered ridges.

It is possible that because the ridge provided concealment, it was used as an approach route to game animals grazing on the flats.

Western Energy Shelter (24RB1033). Site 24RB1033 is located in the north-east quarter of Sec. 32, R41E, T2N. The shelter faces southward and is slightly above the floor of the east-west extending dry wash that dissects Sec. 32. Ponderosa pine, chokecherry, and native grasses constitute the vegetation of the immediate site surroundings.

Debris from lithic tool manufacture was found on a low sandstone outcrop directly above the rock shelter. Because of the proximity of the debitage, it was felt necessary to test the shelter for subsurface cultural material. The shelter was excavated to a depth of 49 inches below surface at which point bed-rock was encountered. The subsurface strata consisted of sand deposited by wind and water, and rock sloughed from the shelter's ceiling.

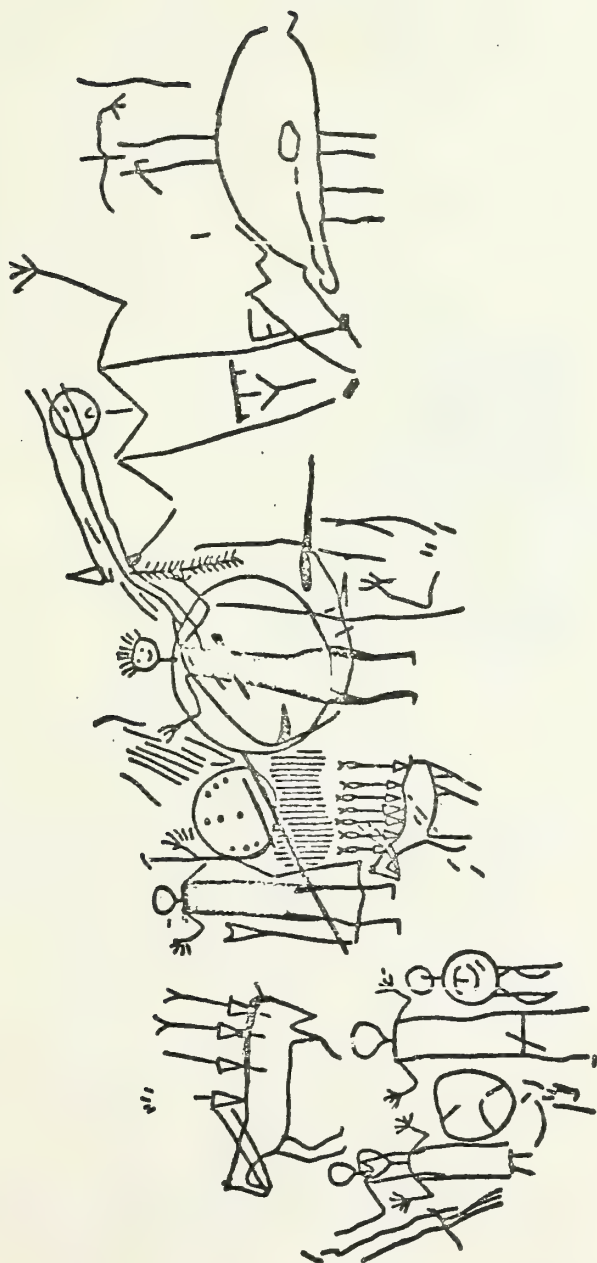
At a depth of 5 inches below the surface was encountered a fragmented wood floor composed of 2-inch thick, sawed planking, some of which still evidenced green paint. Other historic items recovered included a metal can, glass, and cloth fabric found at 11 inches below the surface. A concentration of charcoal at about 12 inches below the surface suggests that part of the wood structure had burned.

Another south-facing rockshelter located during the survey had formed at the base of the sandstone outcrops in the southeast one-quarter of Sec. 3, R41E, T1N. The shelter measured 25 feet wide by 10 feet deep. Cow manure mixed with wind-blown sand covered the entire floor area. No surface indication of human habitation was detected. However, since the shelter would have

provided excellent protection and concealment for prehistoric peoples, testing of the floor deposits was warranted. A test location near the center of the cave's length on the outer lip of the floor was selected. Below the surface mixture of sand and cow dung was encountered clean, aeolian-deposited, compacted sand stratum disturbed by occasional rodent holes and with occasional rock that had sloughed from the ceiling. There was no indication of human habitation. Consequently test excavation was terminated 36 inches below surface level, at a point where sloping bedrock was encountered.

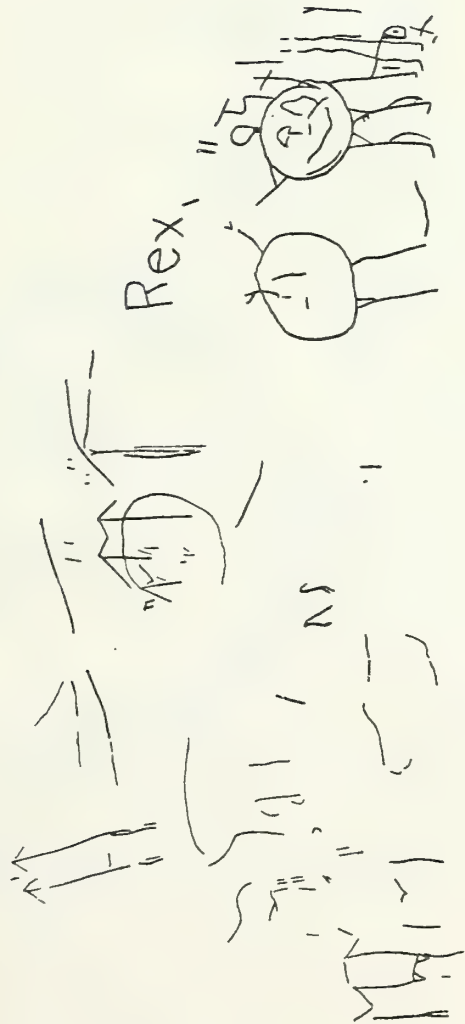
The Cattail Site (24RB1015). Site 24RB1015 is located on the second terrace above Armells Creek. Surface debitage extends for approximately 100 yards along the terrace. The vegetation in the immediate area includes cottonwood and chokecherry along the creek, and sage and native grasses on the terraces. Because the cultural deposits are entirely on the surface, cultivation has caused considerable damage to the site. Thus, I felt the site warranted no further study.





Panel 1, Ellison Petroglyph site.

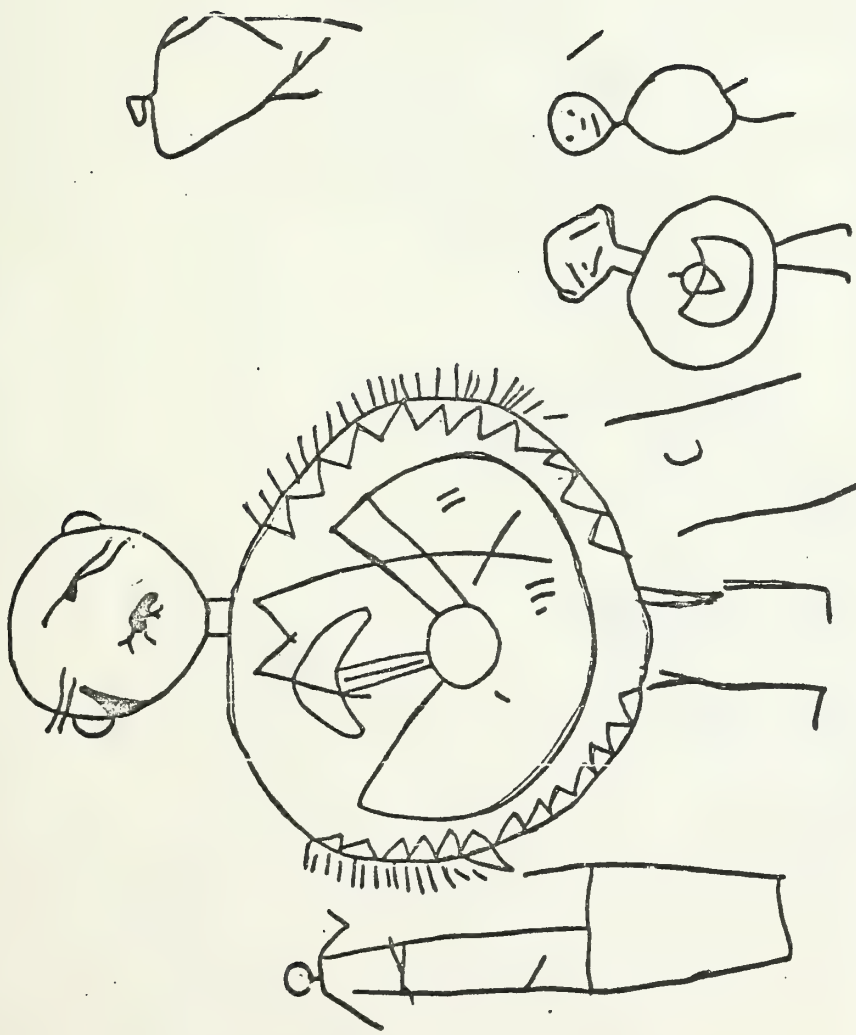




Panel 2, Ellison Petroglyph site.

02  
H

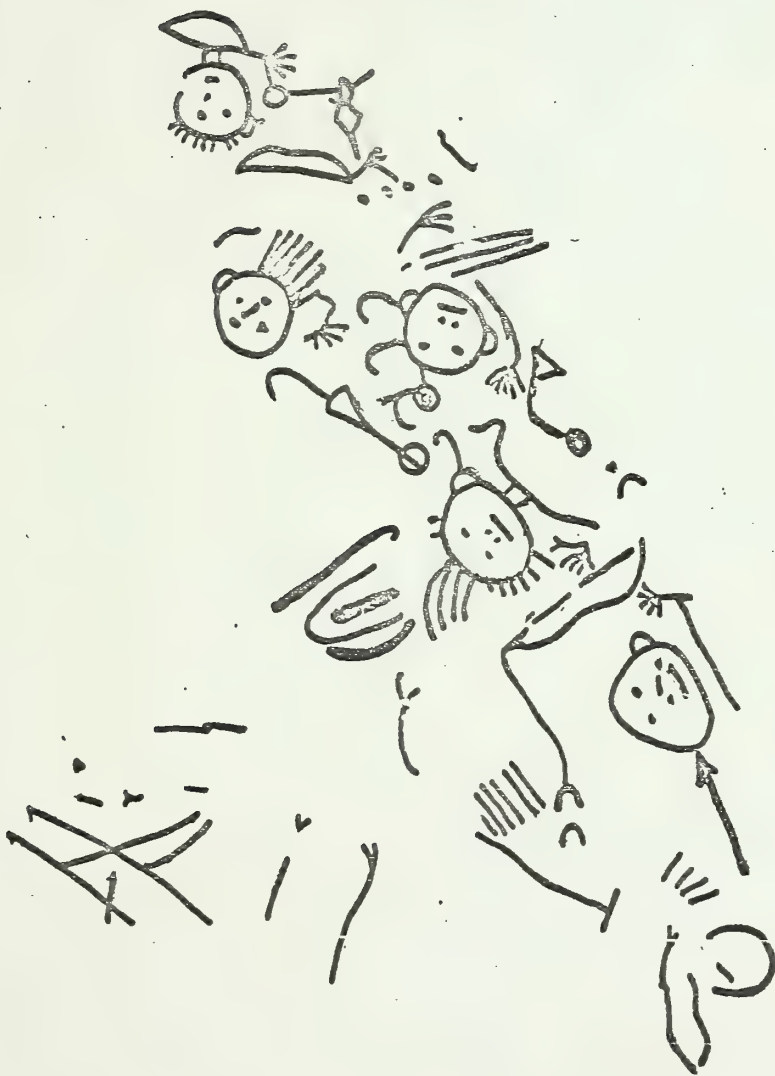




Panel 3, Ellison Petroglyph site.

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Panel 4, Ellison Petroglyph site.



## EMISSIONS EFFECTS



## INTRODUCTION

In January, 1972, the Montana Agricultural Experiment Station initiated a preliminary investigation into the effects of coal-fired power plant stack emissions on the range resource in the vicinity of Colstrip, Montana. This study was the initial step of a potential program extending over several years. It was requested and supported by the Montana Power Company through the Endowment & Research Foundation of Montana State University. The objectives of the investigation were to:

1. Gather literature and information on coal-fired generating plant emissions and monitoring systems.
2. Inspect the site of the power plant and the adjacent areas.
3. Prepare a realistic and comprehensive proposal for implementation of a formal study.
4. Submit a budget for the investigation.

### Substances Recommended for Study

Of the elements or gases already discussed, arsenic, poly-nuclear hydrocarbons, carbon monoxide, and gaseous hydrocarbons have not been considered in this category. Levels of these substances in the plant emissions will be extremely low or the pollutant may be readily removed from stack gases and hence to not warrant expensive analyses.

An analysis of fly ash for radionuclides should be made. If an estimation of particulate fallout and radionuclides shows a potential accumulation problem, a monitoring program should be initiated. Calculated maximum concentration that could possibly be derived from power plant emissions should always be significantly lower than maximum permissible concentrations in air as established by the Public Health Service.

### Sulfur Dioxide:

This gas has been shown to produce toxic symptoms in several sensitive plant species at very dilute concentrations in the atmosphere. Ponderosa pine and alfalfa

are very sensitive to sulfur damage and are common in the study area. Atmospheric concentrations as low as 0.1 ppm sulfur dioxide produce injury in sensitive plant species if the fumigation is extended over prolonged periods of time (Hindawi, 1968). Because of the known presence of sulfur sensitive plants near Colstrip, the atmospheric concentration of sulfur will be very critical in this area.

The sulfur content of an individual plant is a poor indicator of plant damage or of environmental sulfur contamination since plant sulfur is quite variable. Vegetative sulfur concentration depends upon the species of plant analyzed and environmental conditions during the growth of the plant in addition to the rate and length of sulfur fumigation. In some instances, sulfur concentrations may be higher in healthy plants than in sulfur damaged ones and sulfur injury, if any occurs, can only be interpreted by visual inspection. Plant damage should be reflected, however, in the average sulfur content of a plant species.

Sulfur contents of vegetation established prior to power plant operation and compared to sulfur levels in the same plant species after operation of the generators will yield valid judgments as to the extent of sulfur fumigation during operation of the generating complex.

#### Oxides of Nitrogen:

These oxidizing substances are quite damaging to various plant species. Nitrogen dioxide is especially damaging to plants during periods of cloudy skies and high humidity. Some plant damage may occur in early summer at Colstrip if the oxides of nitrogen are released in sufficient quantity during this period of rapid plant growth. The function of nitrogen oxides in the formation of smogs was discussed under the emission of hydrocarbons in the previous section of this proposal.

Because of the wide variation in plant nitrogen concentrations no analytical technique has been developed that will allow interpretation of nitrogen contents of vegetation as an indicator of plant damage. Diagnostic study of affected vegetation

can reveal nitrogen oxide damage to vegetation only after it occurs.

At the present time sulfur dioxide and nitrogen dioxide damage are very difficult to describe analytically. To develop a picture of atmospheric concentrations of these two gases, a monitoring of existing air quality is strongly recommended. Data available from the sampling sites established by the Montana Power Company to monitor air quality and a diagnostic survey of vegetation should reveal the extent of sulfur and nitrogen oxide damages.

#### Fluoride:

Reports of the toxicity of this element to cattle are usually associated with aluminum reduction works or phosphate fertilizer plants because of the massive release of fluorides from these operations. Fluoride levels in the coal to be utilized at Colstrip and the rate of coal utilization anticipated at this plant justify close examination of the accumulation of this element in plants and animals on the range near the power plant.

The main route of fluoride accumulation in plants will be by foliar absorption since plant roots absorb little fluoride from the soil. In addition to absorbed fluoride some particulate matter high in fluoride will be found on plant leaves. It is inevitable, therefore, that animals feeding in the area influenced by stack gases from the Colstrip power plant will accumulate fluoride in their tissues. However, the low fluoride level in the coal, the retention of fluoride in fly ash, and the removal of hydrogen fluoride gas by wet scrubbers should reduce fluoride emissions below critical levels and fluoride should not pose an environmental hazard under the present production schedule at Colstrip.

Fluorides accumulate in skeletal tissues of mammals and produce damage by altering the normal molecular structure of these tissues. This action in cattle has been extensively studied and the probability of toxic accumulation because of the Colstrip power plant is remote. Much less is known of the effect of this element on wildlife and this facet of the total fluoride picture will be investigated

along with the accumulation in cattle.

Ponderosa pine, the most common tree in this area, is especially sensitive to fluoride damage. If atmospheric fluoride concentrations exceed the limits tolerated by this pine, an early loss of needles can be predicted. A decrease in the vigor of these trees may result in increased insect damage, and die off of most of the trees in the fumigated area will likely follow within a few years.

#### Mercury:

The toxicity of mercury has been well documented and federal levels in meat have been established. If mercury emissions are high enough, the movement of small amounts of mercury through the food chain may cause liver or kidney levels in range cattle to exceed federal tolerance limits without visible damage to the animals. The resulting economic loss to the ranchers in the study area could be substantial.

#### Selenium:

Several species of the genera Astragalus and Stanleya are known to accumulate selenium from the soil in which they are growing. Western wheatgrass (Agropyron smithii) has also been identified as a selenium accumulator but at lower levels than the other species. These plants are found in the Colstrip area and western wheatgrass is one of the dominant grasses on parts of the range in this area. Cattle generally avoid selenium accumulators but will not ignore the more common palatable grasses on the range. Thus, high selenium levels in western wheatgrass could be quite damaging on this rangeland.

A selenium concentration in cattle feed as low as 4 ppm is considered by some authorities to be the minimum level in food at which this element may accumulate in animal tissues and ultimately produce the characteristic signs of selenium toxicity (Underwood, 1962). Low levels of selenium, if present in stack emissions, could contribute sufficient quantities of this element to the soils of the area and permit range plants to approach this minimum critical selenium level.

## Cadmium & Lead

These two elements are accumulative poisons similar to mercury. While neither of these is absorbed by terrestrial plants from the soil in appreciable quantities, foliar absorption and contamination does take place. If low level emissions of either of these elements from the power plant occur, food chain transfer and accumulation will take place and concentrations within the liver or kidneys of range animals will be elevated.

Unlike mercury, federal tolerance levels for cadmium and lead have not been established for foods destined for human consumption. The Environmental Protection Agency is presently considering such levels and long term accumulation in range cattle may pose economic problems for ranchers attempting to market animals from areas contaminated by cadmium or lead.

## Beryllium and Chromium:

These elements are relatively unknown in the field of trace metal studies. Their extreme toxicity has been established and their carcinogenic properties substantiated by several investigators. Until the concentration of these two elements in the coal to be utilized at Colstrip has been determined and soil and plant levels analyzed, they should be viewed with caution. If emission of these elements occurs, the movement of the metals in the ecosystem will be carefully monitored.

## Recommendations:

The present state of our knowledge of emissions from fossil fuel burning plants is fairly sophisticated. We can analyze the fuel or stack emissions for elemental composition and interpret meteorological data to determine fallout patterns. Unfortunately, our knowledge of the effect of many of these emissions on vegetation and animals or of synergistic effects of combinations of two or more of these emissions is very limited. In view of these facts it is recommended that selenium, cadmium, lead, beryllium, and chromium concentrations in soils, forage and cultivated

vegetation and animal tissues be established before the generating plant becomes operational in 1975. Monitoring of these elements after this date will reveal changes in the concentration of these metals in the appropriate compartment. If significant changes in the elemental composition of any trophic level occur, potential damage to the range resource will be implied. Trophic level concentration changes will precede visible signs of range deterioration by one to several years and corrective action may be implemented before substantial damage to the range resource has taken place.

Plant damage due to sulfur or nitrogen dioxide in the atmosphere has been established but their influence on animals is still the subject of much research and debate. Since there are no present techniques to evaluate plant damage by these emissions other than by visual inspection of damaged vegetation, an air monitoring program for total sulfur and oxides of nitrogen is appropriate. Constant monitoring of atmospheric sulfur and nitrogen oxides will indicate if these atmospheric levels approach minimum toxic limits for the sensitive plants in the area. Furthermore, sulfur levels in dominant vegetation will be established prior to plant operation and monitored after power production has begun. Sulfur accumulation in the dominant species will be established by this procedure and the extent of sulfur dioxide fumigation after 1975 assessed.

Fluoride levels in vegetation and animals should be determined before 1975 and monitored after full plant operation. Cattle, deer, and antelope are found on the ranges near Colstrip throughout the year and will be subjected to increased fluoride uptake if substantial quantities are emitted by the powerplant. Elevated fluoride levels on vegetation of the area could be quite harmful to animals spending their entire life span on these ranges.

Mercury should be monitored in terrestrial animals and aquatic organisms. Although preliminary analyses of the coal to be burned indicate "normal" mercury levels

at least one published report has indicated elevated mercury levels in coal from Rosebud County. Until mercury concentrations in indicator organisms have been established before and after plant operation, this toxic substance must be viewed with caution.



WILDLIFE AND ECOLOGICAL REPORT



The following is from a preliminary wildlife and ecological report prepared by the Ecological Consulting Service of Helena for the Western Energy Company and Stearns-Roger Corporation.

The survey covers an area 10 by 20 miles, which the consultants believe is the area possibly affected by emissions from the proposed generating plant. Along with the wildlife study, the consulting service will analyze the downstream effects of removing the estimated 8,000 gallons per minute cooling water from the Yellowstone River. The effects on fish, irrigation, municipal and recreational uses will be studied.

## I. DESCRIPTION OF STUDY AREAS

### A. Location and History

The five areas of study are adjacent to Colstrip, Montana. They include A & B, Old Spoils, Experimental and Control areas. Colstrip has an approximate population of 266 persons most of whom have some connection with mining or construction activity in the immediate area. There has been periodic strip mining for coal in the vicinity for more than 50 years.

The study areas were investigated for wildlife species and vegetative communities which support them. Historically, the general Colstrip area has supported a large wildlife population and was used by Indians. With settlement, the area was used for raising livestock with the valley bottoms and other suitable areas cultivated for agricultural use. A comparison of the writings of early explorers and inhabitants of the area reveal an alteration of its vegetative complexes through a century of heavy grazing and other agricultural practices.

However, livestock and agricultural use has co-existed with an abundance of native wildlife and a few exotic species of introduced wildlife. Just prior to the 1900's, wildlife was at a low ebb throughout Montana but good conservation practices and improved range management allowed most wildlife species to build until, in the mid-fifties, deer population reached a peak statewide. By the late sixties, deer and

antelope populations and other wildlife species became stabilized with better harvest methods and hunting seasons more closely geared to available winter range.\* Today, eastern Montana is one of the better wildlife areas of Montana. Areas A and B amount to approximately 6/10ths of one percent of Deer and Antelope Hunting District 72 in which they are located.

#### B. Physical Description and Vegetative Communities

##### 1. Area A

##### 2. Area B

These are the two areas proposed for strip mining of coal. They lie adjacent to each other immediately west of Colstrip with State Highway No. 315 as their common eastern boundary. Each area is approximately 3 miles east-west and  $1\frac{1}{2}$  to  $2\frac{1}{2}$  miles north-south. Each area contains approximately  $5\frac{1}{2}$  square miles with a collective total of about 11 square miles, and mining will be done only where the overburden is less than 150' deep.

Area A is bounded on the north and Area B is bounded on the south by higher elevation east-west ridges with Ponderosa Pine-type forests of varying density. The ridges slope to a rolling-type terrain on the valley bottoms, which consist of grassland types where the major portion is under agricultural cultivation. Lands cultivated for wheat and alfalfa in Areas A and B amount to slightly less than 1 square mile.\*\*

An intermittent stream, the East Fork of Armell's Creek, drains the major part of both Areas A and B and serves as the arbitrary east-west dividing line between Area A and B. The East Fork joins the main stream of Armell's Creek at Colstrip. Armell's Creek flows past Colstrip in a northerly direction approximately 35 miles to the Yellowstone River.

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\*Montana Fish and Game Department Environmental Statement, "Annual Statewide Harvest of Big Game Animals", Project no. FG-22, July 24, 1972.

\*\*Calculated from Montana Power Company map

Two major vegetative zones occur on both Area A and B: Ponderosa Pine and Sagebrush-Grassland. The Ponderosa Pine Zone occupies the northern part of Area A and the southern part of Area B. The elevations of the Ponderosa Pine Zone run from about 3,400 feet to about 3,600 plus feet. The Sagebrush-Grassland Zone occupies the remainder of both areas from an elevation of about 3,300 feet to 3,400 feet. In the total of Areas A and B there are approximately 5 square miles in the Ponderosa Zone and 6 square miles in the Sagebrush-Grassland Zone. The two zones are not clearly defined in all areas and a gradation from one to the other is common. The widest variety of plant species and associated wildlife occurs within the ecotone between Zones.

### 3. The Old Spoils Area

This area is east and south of Colstrip where spoil banks and piles date from 1921 to the present. The old spoils ridges are characterized by steep slopes and sharp tops. Some faces of the old spoils are nearly barren of vegetation and others are heavily vegetated by volunteer species in complex and radically differing communities and are used by a variety of larger wildlife. Wildlife species in the area were studied to comment on the value of the old spoils to wildlife.

### 4. Experimental Area

Reclamation experiments are being conducted in various places among the spoils area by Dick Hodder et al.\* Experimental areas have been shaped to gentler slope and terrain configuration and carry a variety of planted and volunteer types of vegetation and receive some wildlife use. However, since the areas have only been established for 4 years, it is too early to determine the potential degree of wildlife use which can be expected as vegetation becomes more fully established. The area was studied for some comparison of wildlife use on the untouched spoils areas and "reclaimed" areas.

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\*Coal Mine Land Reclamation Research (Reports from 1968 through 1972.)

## 5. Control Area

A control area was established on the Don Bailey Ranch approximately 12 miles south of Colstrip. It was chosen as a place similar to Areas A and B and which was unlikely to be disturbed by major land use changes in the near future. Studies were made on comparable vegetative zones for comparison with Areas A and B and the Spoils Area.

### C. Additional Data

#### 1. Climate and Weather

The average annual precipitation in the Colstrip area is about 15 inches, with the number of frost-free days varying from 115 to 120 days. The weather is characterized by sudden and extreme changes with blizzards, hail, high winds, snow and drought being part of the "average". Summers can be extremely hot and winters very cold and severe. Temperatures may vary from 100° F. to minus 40° F. From spring 1972, to date, precipitation has been above average with a periodicity that has produced exceptional plant growth.

## II. WILDLIFE

### A. Game Birds\*

#### 1. Observed or identified:

- a. Sharptailed Grouse . . . Pedioecetes phasianellus . . . (all)
- b. Ring-necked Pheasant . . . Phasianus colchicus . . . . . (7)
- c. Sage Grouse . . . . . Centrocercus urophasianus . . . (3)

#### 2. Known to use the area, but not observed:

- a. Mallard . . . . . Anas platyrhynchos . . . . . (8)
- b. Greenwinged Teal . . . Anas carolinensis . . . . . (8)
- c. Bluewinged Teal . . . Anas discors . . . . . (8)
- d. Hungarian Partridge . . Perdix perdix . . . . . (7)

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\*As defined by Montana law.

## B. Non-game birds

### 1. Observed or identified:

- a. Sp. Sandpiper. . . . . Actitis macularia. . . . . (8)
- b. Mourning Dove . . . . . Zenaidura macroura . . . . . (all)
- c. Great Horned Owl . . . . . Bubo virginianus . . . . . (all)
- d. Cooper's Hawk . . . . . Accipiter cooperii. . . . . (6,9)
- e. Short-eared Owl . . . . . Asio flammeus . . . . . (all)
- f. Red-tailed Hawk . . . . . Buteo jamaicensis . . . . . (all)
- g. C. Nighthawk . . . . . Chordeiles minor . . . . . (all)
- h. Marsh Hawk . . . . . Circus cyaneus . . . . . (4,5,7)
- i. Red-shafted Flicker . . . . . Colaptes cafer . . . . . (6,7,9)
- j. Pigeon Hawk . . . . . Falco columbarius . . . . . (all)
- k. Hairy woodpecker . . . . . Dendrocopos villosus . . . . . (6,9)
- l. Sparrow Hawk . . . . . Falco sparverius . . . . . (all)
- m. E. Kingbird . . . . . Tyrannus tyrannus. . . . . (all)
- n. Killdeer . . . . . Charadrius vociferus . . . . . (7)
- o. W. Kingbird . . . . . Tyrannus verticalis . . . . . (7)
- p. Say's Phoebe . . . . . Sayornis saya . . . . . (6,7,9)
- q. Horned Lark. . . . . Eremophila alpestris . . . . . (4,7)
- r. Bank Swallow . . . . . Riparia riparia . . . . . (2)
- s. Barn Swallow . . . . . Hirundo rustica. . . . . (4,7)
- t. Cliff Swallow . . . . . Petrochelidon pyrrhonota. . . . . (all)
- u. B-b Magpie . . . . . Pica pica . . . . . (all)
- v. Pinon Jay . . . . . Gymnorhinus cyanocephala . . . . . (all)
- w. B-c Chickadee . . . . . Parus atricapillus septentrionalis . . . . . (6,7,9)
- x. Brown Thrasher . . . . . Toxostoma rufum . . . . . (7)
- y. Robin . . . . . Turdus migratorius . . . . . (all)
- z. M. Bluebird . . . . . Sialia currucoides . . . . . (6,7,9)

aa.	Loggerhead Shrike . . . . .	<u>Lanius ludovicianus</u> . . . . .	(4,7)
bb.	Starling. . . . .	<u>Sturnus vulgaris</u> . . . . .	(4,7)
cc.	W. Meadowlark . . . . .	<u>Sturnella neglecta</u> . . . . .	(4,7)
dd.	Redwinged Blackbird . . . . .	<u>Agelaius phoeniceus</u> . . . . .	(4,7)
ee.	Brewer's Blackbird . . . . .	<u>Euphagus cyanocephalus</u> . . . . .	(4,7)
ff.	B-h Cowbird . . . . .	<u>Molothrus ater ater</u> . . . . .	(4,7)
ff.	Lark Bunting. . . . .	<u>Calamospiza melanocorys</u> . . . . .	(6,9)
gg.	Vesper Sparrow . . . . .	<u>Poocetes gramineus</u> . . . . .	(6,9)
hh.	Lark Sparrow . . . . .	<u>Chondestes grammacus stri-</u> <u>gatus</u> . . . . .	(6,9)
ii.	Brewer's Sparrow . . . . .	<u>Spizella breweri breweri</u> . . . . .	(3)
jj.	White-crowned Sparrow . . . . .	<u>Zonotrichia leucophrys</u> . . . . .	(6,9)
kk.	Song Sparrow . . . . .	<u>Melospiza melodia</u> . . . . .	(6)
ll.	Rocky Mountain Nuthatch . . . . .	<u>Sitta carolinensis nelsonii</u> . . . . .	(4)

2. Known to be in the area, but not observed:

a.	Swainson's Hawk . . . . .	<u>Buteo swainsoni</u> . . . . .	(all)
b.	Ferruginous Hawk . . . . .	<u>Buteo regalis</u> . . . . .	(all)
c.	Golden Eagle . . . . .	<u>Aquila chrysaetos canadensis</u> . . . . .	(all)
d.	Prairie Falcon . . . . .	<u>Falco mexicanus</u> . . . . .	(2,4,5,7)
e.	G. Yellowlegs . . . . .	<u>Totanus melanoleucus</u> . . . . .	(8)
f.	Rock Dove . . . . .	<u>Columbia livia</u> . . . . .	(5,7)
g.	Y-b Sapsucker . . . . .	<u>Sphyrapicus varius</u> . . . . .	(6,9)
h.	Downy Woodpecker . . . . .	<u>Dendrocopus pubescens</u> subsp. . . . .	(6,9)
i.	Tree Swallow . . . . .	<u>Iridoprocne bicolor</u> . . . . .	(7)
j.	House Wren . . . . .	<u>Troglodytes aedon</u> subsp . . . . .	(7)
k.	Catbird . . . . .	<u>Dumetella carolinensis</u> . . . . .	(7)
l.	E. Bluebird . . . . .	<u>Sailia sialis</u> . . . . .	(6,9)
m.	W. Bluebird . . . . .	<u>Sailia mexicana</u> . . . . .	(6,9)
n.	Cedar Waxwing . . . . .	<u>Bombycilla cedrorum</u> . . . . .	(6,9)

- o. Yellow Warbler . . . . . Dendroica petechia subsp . . . (7)
- p. Yellowthroat . . . . . Geothlypis trichas subsp . . . (7)
- q. Grasshopper Sp . . . . . Ammodramus savannarum . . . . (7)
- r. McCown's Longspur . . . . . Rhynchophanes mccownii . . . . (7,9)

### 3. Rare and endangered species\*

Rare and endangered species are defined as those birds which, according to the Committee on Rare and Endangered Wildlife Species of the Bureau of Sport Fisheries and Wildlife, are so few in numbers or are so threatened as to be in danger of extinction.

No endangered bird species was in evidence in either the study area or in the general vicinity. The Prairie Falcon, which is known to be in the area, is classified as a rare bird, but not an endangered species. In the opinion of a qualified ornithologist familiar with the area, Peregrine Falcons will not be found there.\*\*

### 4. Birds of prey

Birds of prey were found throughout the entire area and also outside the perimeter of Areas A and B, with the exception of the Cooper's Hawk, which was seen only in the Ponderosa Pine Zone. The other raptors were seen over the entire general A and A areas.

### 5. Mammals -- Game Species\*\*\*

#### a. Observed or identified:

- 1. Mule Deer . . . . . Odocoileus hemionus . . . . . (all)
- 2. Pronghorn Antelope . . . . . Antilocapra americana . . . . . (all)

### 6. Mammals -- Non-game Species

#### a. Observed or identified:

##### 1. Predators:

- a. Badger . . . . . Taxidea taxus . . . . . (all)
- b. Raccoon . . . . . Procyon lotor . . . . . (all)

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\*As defined by the Committee on Rare and Endangered Wildlife Species of the Bureau of Sports Fisheries and Wildlife

\*\*Kenneth Walceck, Montana Fish and Game Department

\*\*\*As defined by Montana law

- c. Red Fox . . . . . Vulpes vulpes . . . . . (all)
- d. Coyote . . . . . Canis latrans . . . . . (all)
- e. Bobcat . . . . . Lynx rufus . . . . . (all)

2. Others:

- a. Thirteen-lined Ground Squirrel . . . . Citellus tridecemlineatus . . (1,7,10,11)
- b. Least Chipmunk . . . . . Eutamias minimus . . . . . (6,9)
- c. Northern Pocket Gopher . . Thomomys talpoides . . . . . (all)
- d. Western Deer Mouse . . . . Peromyscus maniculatus . . . . (all)
- e. White-footed Mouse . . . . Peromyscus leucopus . . . . . (6,9)
- f. Porcupine . . . . . Erethizon dorsatum . . . . . (all)
- g. Eastern Cottontail . . . . Sylvilagus floridanus . . . . . (all)
- h. White-tailed Jack Rabbit Lepus townsendii . . . . . (all)
- i. Little Brown Bat. . . . . Myotis lucifugus . . . . . (4,6,7,9)
- j. Striped Skunk . . . . . Mephitis mephitis . . . . . (all)
- k. Mink\* . . . . . Mustela vison . . . . . (4,7)

b. Known to be in the area, but not observed:

1. Predator:

- a. Long-tailed Weasel . . . . Mustela frenata . . . . . (6,9)

2. Others:

- a. Richardson Ground Squirrel Citellus richardsonii . . . . . (1,7,10,11)
- b. Ord Kangaroo Rat . . . . . Dipodomys ordii . . . . . (2,6,9)
- c. Northern Grasshopper Mouse Onychomys leucogaster . . . . . (2,6,9)
- d. Western Harvest Mouse . . . Reithrodontomys megalotis . . . (7,Ag.)
- e. Meadow Vole . . . . . Microtus pennsylvanicus . . . . . (4,7,Ag.)
- f. Meadow Jumping Mouse . . . Zapus hudsonius . . . . . (4,7,Ag.)

7. Rare and endangered species

Rare and endangered species are defined as those animals which, according to the Committee on Rare and Endangered Wildlife Species of the Bureau of Sport Fisheries and

\*Furbearer, according to Montana law.

Wildlife, are so few in numbers or are so threatened by circumstances as to be in danger of extinction.

No endangered animals were in evidence in either the study area or in the general vicinity. The Black-footed Ferret, an endangered species, which is closely associated with Prairie Dog towns, could not be expected to be in the vicinity as no Prairie Dog towns were found in the area. However, there are Prairie Dog towns within 50 airline miles of Areas A and B. Wherever there are Prairie Dog towns, the possibility exists that the Black-footed Ferret is also present. This small predator lives in close association with Prairie Dogs and preys upon them. During 1971 and 1972, the Montana Fish and Game Department asked through its bi-monthly magazine for reports of any sightings of Black-footed Ferrets in Montana. Although several reports were sent to the magazine, to our knowledge at this time, there has not been a confirmed Black-footed Ferret sighting in southeastern Montana.

### III. VEGETATION

#### A. Summary

Areas A and B and the Control Area contain very similar plant communities and very similar wildlife species and population densities. The Control Area was selected because it probably will not be disturbed for several years and can serve as a check for those areas which are mined and reclaimed. Portions of the Old Spoils Areas were chosen for study: One was representative of the old untouched spoil banks and the other was on Hodder's reclamation experimentation areas. Due to the extreme vertical and horizontal diversity of plant composition and the wide variance of plant invasion, no transects were established on the old spoils, but species present were investigated and listed.

#### B. Classifications

The vegetation within the study area was classified into two zones: (1) Ponderosa Pine and (2) Sagebrush-Grassland. The species composition of the vegetative zones and

types for which measurements were taken are given in Tables I. through VII. Locations of these vegetative transects are shown on the enclosed map. Plant types which were not quantitatively measured include the Rhus Sagebrush-Grassland type in the Ponderosa Pine Zone and the Agricultural type in both the Ponderosa Pine Zone and the Sagebrush-Grassland Zone. The Ponderosa Pine Zone was divided into seven vegetative types.

These are:

1. Ponderosa Pine Type.
2. Ponderosa Pine-Juniper Type.
3. Big Sagebrush-Grassland Type.
4. Silver Sagebrush-Grassland Type.
5. Rhus Sagebrush-Grassland Type.
6. Caprock Gumbo-Knob Type.
7. Agricultural Type.\*

The Rhus Sagebrush-Grassland Type was further divided into four sub-types, which are:

1. Rhus-Grassland.
2. Rhus-Big Sagebrush-Grassland.
3. Rhus-Silver Sagebrush-Grassland.
4. Grassland Park.

The Sagebrush-Grassland Zone was divided into five vegetative types. These are:

1. Big Sagebrush-Grassland Type.\*\*
2. Grassland Type.
3. Silver Sagebrush-Grassland Type.
4. Creek Bottom Type.
5. Agricultural Type.

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\*Not included in Tables.

\*\*Permission to investigate this type denied by landowner.

Few of the vegetative types were clearly defined within the vegetative zone. There is considerable overlap among the various plant types. There are approximately 5 square miles in the Ponderosa Pine Zone and about 6 square miles in the Sagebrush-Grassland Zone within Areas A and B. The Agricultural Type represented about  $\frac{1}{2}$  square mile in each area.

#### IV. WILDLIFE HABITAT COMPARISONS

##### A. Game Animals

1. Areas A and B mirror each other as wildlife habitat. Five mule deer (2 does, 3 fawns) were observed using the Ponderosa Type on Area A. One doe had a slightly deformed ear and was sighted twice.

Seven mule deer (2 does, 2 fawns and 3 bucks) were observed using the Ponderosa Type on Area B. None of these deer had identifiable individual characteristics.

Checking the vegetational species present with the available literature concerning the overall area reveals an abundance of known deer foods as shown on Table I. The literature indicates that the Ponderosa Type is very important in the mule deer's overall requirements in country such Areas A and B.

Although Areas A and B are important to the deer using them, they represent only 6/10ths of 1 percent of Hunting District #72.

As deer winter range, the importance of any part of Areas A and B is unknown. Winter range is the limiting factor of deer populations. Establishment of observation routes and food habits studies during the fall-winter-spring period would define the importance of the area as winter habitat.

2. The Control Area is so similar to Areas A and B that one could expect similar deer usage and interviews with the landowner (Don Bailey) support this. Establishment of observation routes and food habits studies during the fall-winter-spring period would enable a relationship of deer population presence and usage between the Control Area and Areas A and B to be established.

3. Areas A and B and the Control Area are only fair antelope habitat in comparison with the overall area. Two aerial and one ground sighting revealed a lone buck and a group of 3 does, 3 fawns, and 1 buck using the western edge of Areas A and B. Vegetation composition of the areas shows an abundance of known antelope foods.

4. The Experimental reclamation plots in the spoils did not reveal any significant deer use.

Tracks, sign and some observable use of known deer food plants showed the Old Spoils to be used by deer at some times of the year although no animals were observed. Our experience suggests the Old Spoils Area is useful to deer for food, cover and possibly winter range because of its configuration and vegetational content.

The usefulness of the Old Spoils to deer in winter would be regulated by snow depths. As long as the gulleys between the banks do not drift in too severely, food plants would be easier for them to reach there. Observation and plant use data during fall-winter-spring would be necessary to establish this fact. Interviews with local residents indicate the spoils are used by deer during the hunting season. Some hunters consider them favored hunting places. It would seem the deer find the juxtaposition of food and cover advantageous when pursued by hunters.

#### 5. Fish

The East Fork of Armell's Creek does not support a sport or commercial fishery because the creek is intermittent in character. A few small ponds are found in northern Area A, but they have no fish in them. The nearest fishery, in the old box-cut at Colstrip, contains a variety of stocked warm-water fish and some stocked rainbow trout, according to local fishermen and the Montana Fish and Game Department.

### V. COMMENTS ON WILDLIFE

#### A. Present Population

Presently there is a healthy wildlife population of both game and non-game species in Areas A and B. This population does not seem to have any unique features

which make it exceptional in comparison with other areas of southeastern Montana with similar terrain and vegetation.

#### B. Displacement with Mining

If strip mining progresses at the rate of about 100 acres per year and reclamation follows within a three-year period, during any given year of the estimated 35-year period, 300 acres of Areas A and B (more or less) will not provide any important wildlife habitat. The larger, more mobile species will avoid the immediate mining area, but the rate of mining will be slow enough to prevent significant impact on their overall population. At 100 acres per year mining rate, about half the total acres within Areas A and B would be mined during the 35-year life of the mine.

#### C. Impact on Small Mammals

Small mammals will be the most susceptible to population disruptions, but normally they are the first classes of wildlife to return to a disturbed area as it re-vegetates. This class is the most numerous in the food chain and has the highest reproductive potential. They also have high annual and cyclic population fluctuations even when man's actions are not a factor.

#### D. Impact of Increased Local Population

The estimated existing population of Colstrip is 266 with a projected increase to 1,855.\* The Montana Fish and Game Department estimates that one person in three buys some form of hunting or fishing license. Applying the 1:3 ratio to the present Colstrip population indicates that about 89 hunting/fishing licenses are sold to residents. When the population increases to 1,855, the number of licenses will grow to 618. This would have a major impact on the immediate Colstrip vicinity including Areas A and B.

If Areas A and B are reclaimed for heavy recreational use, the mere activity of people will make the larger wildlife forms more wary of the area, especially during the daylight hours and in the milder months. Also, if reclamation includes high use

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\*Ken R. White Co. data.

recreational development, hunting is seldom allowed in these areas. The impact of human population on the game species would also be felt outside Areas A and B.

An increase in people brings a corresponding increase of domestic pets and will create an abnormally high "predator" density in a small area. House cats and dogs in uncontrolled or semi-controlled conditions will have some affect on the wild-life in the immediate Colstrip vicinity.

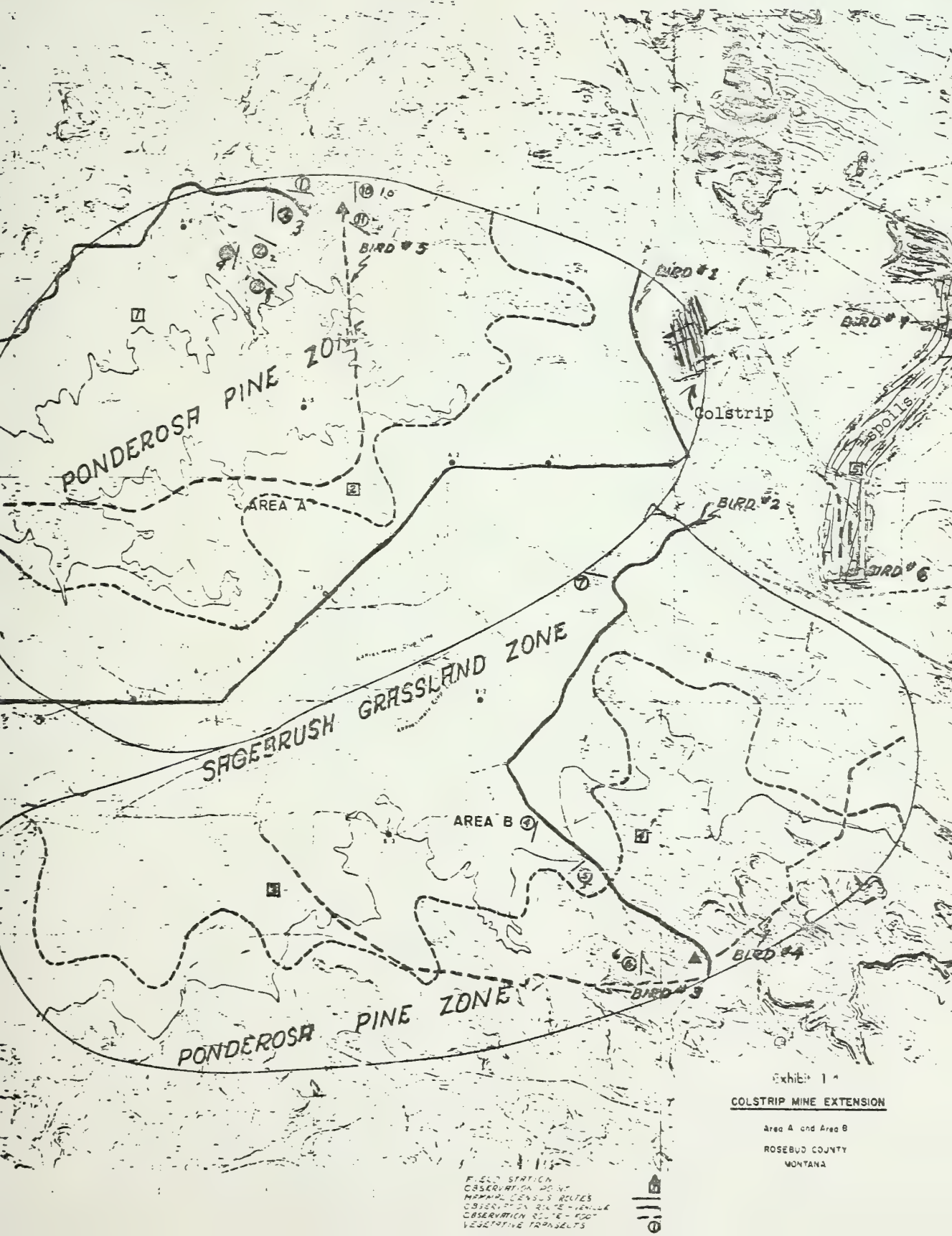
#### E. Effect of Artificial Lake

A body of water of any size in the A and B Areas, where none presently exists, would draw waterfowl, especially during migration seasons. Depending upon the vegetative complexes established around the lake, some nesting of various waterfowl species could be expected if human intrusion is kept at a minimum during nesting season. Only an occasional pond now exists in northern portions of Area A and no significant natural bodies of water exist in the Colstrip vicinity. The popularity of the artificial mini-lake created by the seepage filling an old box-cut at Colstrip demonstrates that a more amenable body of water would receive high use from people living in the area.

#### F. Consideration of Small Mammals, Raptors and Predators

Preliminary findings on the Old Spoil Area and the Experimental Area show no signs of burrowing animals establishing themselves there. To some types of burrowing animals, such as pocket gophers, soil types are almost as important as vegetation types. If the habitat conditions of the reclaimed land on Areas A and B do not provide the needs for burrowing animals, the foodchains utilized by predators and raptors will be affected. The absence of these burrowing animals on reclaimed areas will reduce the food supply for them and one would not see as many of them utilizing this reclaimed area. However, raptors have great mobility and the size of the area is small enough that they will fly past or over the area.

In a predominantly high-use recreational area, small birds and small mammals are susceptible to destruction due to the thoughtlessness and carelessness of people.





## AGENCY AND PUBLIC COMMENTS



Because of space requirements, it was necessary to condense some letters commenting on the Draft Statement, as follows:

Name	Main Points Raised
Richard A. Wortman Consulting Geologist Bozeman, Montana	Stated efficiency of scrubbers doubtful. Other plants at Fruitland, New Mexico, Casper, Wyoming, and Kemmerer, Wyoming, have much lower scrubber efficiency than promised by operators.
Montana Chapter American Assoc. of Univer- sity Women (unsigned)	Too many unknown facts about long term effects. Statement should contain definite information on pipeline size. No permit should be granted until the possibility of using dry towers is assessed. More documentation needed on particulate removal. Impact on schools not assessed. Energy conservation might eliminate need for plant, saving money to use in developing more efficient generating techniques.
Ron Schleyer Billings, Montana	Insufficient cause seen for violating "non-degradation" clause in Air Quality Implementation Plan. Biocides in cooling towers might cause impact on biota. Dry towers could be used.
Margaret Busha Sweet Grass County Treasurer Big Timber, Montana	Stop the plant; save Montana for Montanans.
American Association of University Women Edith Gronhovid Jean M. Evans Billings, Montana	A moratorium should be placed on this and similar developments until legislation is passed to adequately safeguard the environment and guarantee complete land reclamation and until other alternatives to construction of the plant are thoroughly studied.
Vincent Amicucci, M.D. Vice President, Audubon Society Helena, Montana	Industry must take care to safeguard the environment. Construction of additional plants could threaten minimal flows in the Yellowstone River. Site approval by the State should be required.
Mrs. William F. McKinney Birney, Montana	Draft statement contained insufficient data on fluorides and mercury. Dust from strip mining will cause health hazard. Large scale water evaporation could cause weather alterations. EPA or the state should monitor plant emissions, rather than the plant owner. What effect will ash have on groundwater? Future generations will be sorry if plants are built.
Mavis McKelvey Montana League of Conser- vation Voters Missoula, Montana	Non-degradation clause in the National Environmental Policy Act should be upheld. Burning coal at 30% efficiency not economical. Increased tax base caused by industrial development more than eaten up by needed services. Employment will not continue indefinitely. Ghost towns in Montana demonstrate futility of expecting long term

returns from mining. Additive factor of emissions may occur between emissions from Colstrip and Billings. Much power wasted. New York City uses 65% of its power in lighting, including empty office buildings. Montana should call a halt to further despoilation.

American Association of  
University Women  
Elizabeth Miller, Chairman  
Bozeman, Montana

Statement does not provide clear evidence that the known facts outweigh the known facts enough to justify issuance of permit. No more than one plant should be permitted until the first one has been evaluated to answer pertinent questions. Plant was under construction two years before respondent was asked to comment. Additive effects between Billings, Colstrip plants will occur. Computer modeling inadequate since it was not based on established fact. Trace element analysis needed. Scrubber efficiency on mercury vapor needs to be known. More information needed on emission of fluoride and radioactive materials. Weather modifications possible from humidity increase from cooling towers. Small changes in the ecosystem resulting from emissions should be carefully monitored, and when damage appears pollution should be abated. The alternatives portion should have listed alternatives and generating developments expected in the next 5, 10, or 20 years. Energy consumption should be moderated through changes in the price structure used by utilities. Coal consumption should be slowed and continued at a low rate over a long period, with boom bust cycle scaled down to a permanent economic asset for the area. Technological advances in coal conversion techniques and solar energy should be encouraged.

Carolyn and Irving Alderson  
Ranchers  
Birney, Montana

Federal non-degradation clause should be enforced. Total effects of strip mining, water diversion from Yellowstone River, construction of transmission lines, all contribute to environmental degradation. The number of unknown factors cited in the statement are evidence that a permit should not be issued. The vast coal generating complex in the Southwest should have been analyzed for environmental impacts of the sort likely to result from the Colstrip project. Montana Power "arrogant" for beginning construction without a permit. Reclamation of strip mined land not proven for areas such as Colstrip. Strip mining might adversely affect groundwater. Considering the above, granting a permit would be irresponsible.

Montana Federation of  
Women's Clubs  
Mrs. William Graham  
Wyola, Montana

Sulfur dioxide and other emissions would have a serious detrimental effect on wildlife, livestock, and surface water.

Doris Milner  
Montana Wildlife Federation  
Hamilton, Montana

Water diversions, structures, aqueducts, pumping stations, transmission lines, and other facilities appurtenant to the generating stations have impacts that were only skimmed over in the draft statement. Cumulative impact

of the plant and related facilities should be assessed in the final statement. An independent assessment should be made of the need for the electricity to be generated. The extent of state control over generation facilities not clear in the draft statement. Public should be alerted to the minimal control available to the state over power plant construction.

Michael Williams, Ph.D.  
Los Alamos, New Mexico

The 90% collection efficiency of fluorides estimated in the draft supplement is too high. Other plants release as much as 97% of fluorides into the air. Predicted fluoride concentrations seem inaccurate. No statement about what conditions they are based on is included in the supplement. Higher values seem to be indicated. TVA experience indicates the maximum 24-hour average is about one-fourth the maximum one-hour average as opposed to one-seventh as stated in the supplement.

Mr. and Mrs. Art Hayes  
Birney, Montana

Pollution concentrations should be monitored at all times. If standards are violated, the plant should be shut down. Otherwise, the surrounding lands will be rendered unproductive. Instead of building mine-mouth plants, the coal should be shipped to the load centers, with a stiff tax. If the plant is built, dry cooling towers should be required.

Christine S. Jones  
Birney, Montana

Montana Power Company negligent in not investing in research on other types of generating equipment. Geothermal power is being developed seriously in Japan, Mexico and Russia. Fly ash buried in spoil banks will cause major pollution problems in the future. Temporary construction workers will have drastic social effect on the area. High fluorides in emissions are a serious health hazard to the nearby Northern Cheyenne Indians, who already have a high TB rate, along with other pulmonary and respiratory ailments. Gradual increase of radioactivity over the life of the plant will lead subtle ill effects in the ecosystem. Monitoring of emissions from the plant should be done by the state. Coal should be mined underground.

Robert R. & Joan Tully  
Ranchers  
Roundup, Montana

Mercury pollution could result from power plants. Air pollution effects from large generating plants are not known. Large size of the proposed plants indicates fluorides and sulfur dioxide could reach dangerous levels even if within standards. How many dangerous air pollution events will be allowed under the law? How much water can be taken from the Yellowstone River without causing ill effects downstream? Reclamation is impossible in arid regions such as Colstrip. Why was construction allowed before a permit was issued? If there is no check on power plant construction, how can it be assured that future plants will not be under construction before emission effects from the proposed plant are assessed adequately?



Because of space requirements, it was necessary to condense some comments that were submitted for the record during and after the public hearing in Miles City, January 5, 1973, as follows.

<u>Name</u>	<u>Main Points Raised</u>
Berkeley and Cynthia Dowd Fishtail, Montana	Draft Statement written in a cursory manner, violating the intent of the Montana Environmental Policy Act. Most information in the draft was supplied by the Montana Power Company and not critically reviewed by the state. No permit should be issued until the Montana Power Company has proved no environmental degradation would result from the plant construction and operation.
Frank Dunkle Ecological Consulting Service Helena, Montana	The Montana Power and Western Energy Policy of "determining accurately what the present ecosystem of the Colstrip area really is today, is fundamental to answering accurately what effects mining and power generation may have on Colstrip and Montana. Sound information is the only realistic basis for comparing short and long range values of natural resources."
Byron J. Bennett, Ph.D. Dean of Engineering Montana State University Bozeman, Montana	Energy shortage is developing. No alternative to planning well for the continued use of coal reserves for at least 20 years. Well financed and organized research needed on alternate types of generation. Gas turbine research should be speeded. Research efforts on alternate generating techniques have "been surface efforts compared to what is needed." The finest air pollution equipment is planned for the Colstrip plant. It would be terrible if we were forced to exist with none of the gas or electric services now provided by Montana Power. Electricity indirectly required for auxiliary fans and pumps in most heating systems. Electricity needed to solve environmental problems.
The League of Women Voters of Montana Grace Edwards Billings, Montana	Analysis of coal needed, especially to determine mercury and fluoride content. Acid rain and fog likely to occur from mixing of plumes of stacks and cooling towers. More information needed on meteorology of the area, and of possible weather modification resulting from the plant, before construction is allowed. The discussion in the draft statement concerning the influx of population is inadequate. What plans exist to handle the influx? What will happen to the area population after the plants no longer function? Montana Power Company should live up to its claim of being a good citizen by working openly and cooperatively with state government and smaller political subdivisions.
Steven Jessen, Editor Forsyth Independent Forsyth, Montana	Economic impact of the plant is already felt in a more stable economy, a widened tax base, and increased prosperity in the area and elsewhere in Montana. The taxed collected by Rosebud County will double by 1976. The best interest of the people of Rosebud County and Montana are being served by developing the coal.

Jerry Landa  
Broadus, Montana

The population of the sparsely people areas are in no way obligated to sacrifice their health, their property, and their way of life for the big population centers elsewhere, as would be accomplished by the operation of power plants. Coal deposits should be kept for future emergencies. The permit to construct should be denied.

Bill Zumpf, President  
Miles City Chamber of  
Commerce  
Miles City, Montana

The Chamber welcomes new business, new industry and the development of all resources. Total membership of the Chamber not agreed about coal development. The Chamber endorses construction of the plants, within the limits of existing law.

Nick Golder, Rancher  
Colstrip, Montana

Agriculture is the backbone of Montana's economy, and will remain so if allowed to by the coal developments. Power shortage may be manipulated by big money and big government. Fluoridated water can be dangerous. Fluoride emissions need further study.

Albert Bud White

Coal development provides God-given opportunity for people to work. Jobs are needed. The state can best serve the majority of the people by providing environmental ground rules that will permit the development of natural resources in an orderly manner, without interruptions and the resulting loss of jobs. Should not build a fence around Montana.

Montana Chamber of Commerce

Adequate electrical power is an integral factor in the continued economic growth of any region. The Colstrip plant will meet or exceed existing regulations for ecological protection. The Board should grant the permit. Population in Rosebud County decreasing in numbers, increasing in average age, indicating unattractive total human environment.

R. D. Shipley  
Beacon Carter Service  
Miles City, Montana

What we do on our own private deeded land is our own business entirely. Environmentalists should be limited to regulating land they own. Coal is needed to combat the energy shortage. Reclamation is possible if strictly regulated. Grazing will be almost restored and the difference in the kinds of plant life will result in improved game habitat and, therefore, in hunting of a different but highly acceptable kind.

Robert J. Shy  
Custer County Rancher

Individuals and corporations have the right to do what they want with privately owned land. The Colstrip plant should be permitted, provided reasonable control is used and the surface lands are replaced or reshaped to the best possible use. Coal should be mined the same as any other resource.

Chuck Searl  
Executive Vice President,  
Billings Chamber of Commerce  
Billings, Montana

Plants at Colstrip should be completed, if they can meet existing and future air pollution standards. Power plant operation should not be allowed if it detracts from the life giving forces of the Yellowstone. The Chamber currently favors only the two 350 MW plants now under construction. Montana will need the electricity by the time the plants are completed.

Harry Swain  
Swain and Morris Construction Company

Existing businesses need more electricity. Farms need more electricity. Oil fields need more electricity. Living standards should not be lowered by trying to conserve electricity by not using air conditioners, radios, televisions, and other appliances that some call luxury items.

Chris Angle

More local industry, power, and employment needed to give stability to the state economy. 87% of students graduated from state colleges leave the state to get work.

Thomas B. Breen, President  
Empire Steel Manufacturing

The energy crisis is real, and Empire Steel, along with the rest of modern society, needs a reliable source of electrical energy. The Colstrip plant should be built.

John L. Hansen, President  
Cop Construction Company  
Billings, Montana

Construction of the Colstrip plant is necessary; the pollution control equipment will keep emissions within standards; and delays in construction will be detrimental to Montana. The next decade will bring the need for 500 more megawatts than now available. Montana Power Company peak loads exceeded their capacity in December, 1972, requiring import of power. If outside power was not available for purchase, industrial power would have been interrupted, causing economic loss. A power shortage impends, and coal-fired thermal plants are the only apparent remedy.

Roy E. Huffman, Ph.D.  
Vice-President for Research  
Montana State University  
Bozeman, Montana

The University does not conduct secret research. Data collected in research at Colstrip is available to state agencies and others with a need to know. When fully interpreted, research results will be available in published reports. MSU is working on meteorological studies for Montana Power Company. Montana Power Company personnel have displayed a sincere interest in determining the air pollution potential at Colstrip, so as to be able to meet state and federal air pollution standards. MSU has worked on reclamation at Colstrip for Western Energy since 1968. Other studies in progress for Montana Power Company include work on the effects of stack emissions, trace element analysis of coal. The sponsors of the research have made no attempt to influence the results of the studies, and they have been fully cooperative.

Robert A. Ratliff, Manager  
Billings Refinery, CONOCO  
Billings, Montana

Coal production should be doubled in the next 15 years to meet the energy crisis. Crude oil imports will have to quadruple. Montana must be concerned about the energy crisis. Billings refinery has experienced 17% compounded annual increase in electrical energy use. More energy yet will be needed, and a reliable source is a must.

James R. Beaty

Should be no urgency in marketing coal, as the energy crisis will cause a continued market. No need to increase Montana pollution to supply energy for out of state. No reclamation effort can be evaluated for at least ten years after all reclamation efforts have ended and the land subjected

to the forces of nature. If coal were hauled by rail to plants near the load centers, Montana would benefit from a stronger rail system. High voltage power lines will not move grain, lumber or other goods into or out of Montana. Strip mining should be permitted on a limited scale for ten years, to be followed by evaluation of the effects on land and water. Shipment of coal should be encouraged over mine mouth plants. No major generating plants except hydroelectric should be allowed unless 50% of the output will be used in Montana or adjacent states contributing directly and strongly to the Montana economy.

I. D. Peterson  
Midland National Bank  
Billings, Montana

Energy crisis is real; generating facilities must be developed to avoid dependence on outside energy sources. Economic and industrial development would stop without required energy. Tax base needed to supply the monetary needs of government. Colstrip plants should be built.

Louise Cross, Delegate  
Montana Constitutional  
Convention  
Glendive, Montana

Coal development occurring so fast that Montanans do not realize the environmental effects taking place. Much water will be used, the remainder polluted; productive land will be destroyed, and the air will be contaminated. Land is the only capital in Montana, and sustains Montanans when all else fails. Montana Power Company is building the plant without a permit, and will use the costs as an excuse to allow the operation of the plant. No public official will have the guts to shut down the plant no matter what it does to land, water, and air. Circumvention of the building permit sets a dangerous precedent for other companies. Power companies want to strip the land, ruin the water, take the coal, transport the power, and make the profits.

STATEMENT

on the

"Draft Environmental Impact Statement on the  
Proposed Montana Power Company Electrical  
Generating Plant at Colstrip, Montana"

by

The Montana Power Company

Presented at

Miles City, Montana

January 5, 1973



STATEMENT OF  
THE MONTANA POWER COMPANY

The Montana Power Company and Puget Sound Power & Light Company on the 14th day of August 1972, filed a joint application, pursuant to the provisions of the Clean Air Act of Montana and the Regulations issued under that Act, to the Air Quality Bureau of the Department of Health and Environmental Sciences for a permit to construct and install equipment and machinery which are capable of emitting air contaminants into the atmosphere and for the construction and installation of equipment for eliminating, reducing and controlling the emission of such air contaminants.

The construction and installation of such equipment and machinery is in connection with two 350 megawatt steam electric generating plants to be constructed by the joint applicants at Colstrip, Montana.

Pursuant to the Montana Environmental Policy Act the Department of Health and Environmental Sciences has issued a draft environmental impact statement directed to the application to construct and install such equipment and machinery. This hearing is directed to the consideration of that draft impact statement.

This statement is made in the belief that The Montana Power Company can and should make constructive comments at this hearing. This statement refers only to the first draft of the Air Quality Bureau's Draft Environmental Impact Statement and if we have additional comments on the supplement to that draft, we

will submit them in writing before the record is closed.

Our comments are intended to supplement the material in the Draft Impact Statement. We ask that they include our remarks in the final environmental impact statement. We feel this would be appropriate since we are the applicant for the Construction Permit.

#### NEED FOR POWER

The projected electric requirements for consumers in The Montana Power Company's service area show that if the Colstrip Project is not built the Company will fall short of meeting the needs of its consumers by about 20% by 1975. This means that not only will no new customers be connected but that some existing customers will be curtailed or cutoff.

Montana Power Company generation, together with purchased power, served the 1971-1972 winter peak load with 124,000 KW to spare. 144,000 KW of power purchased in 1971-1972 will not be available to Montana Power Company by the winter of 1975-1976 because the electric suppliers now selling us this power will need it for their own customers. An additional 27,000 KW of purchased power will be lost to Montana Power Company by the winter of 1976-1977.

The Montana Power Company load historically grows at approximately 5% per year. We see nothing which will substantially change this. If the Colstrip units are not constructed, Montana Power Company will be 174,000 KW deficient by the winter of 1975-1976. Montana Power Company will be deficient by 246,000 KW by the winter of 1976-1977.

## DESIGN PROCEDURES PRIOR TO CONSTRUCTION PERMIT APPLICATION

There has been some confusion expressed in various public statements regarding the procedure used to design and build a project of this complexity; specifically, questions have been raised as to why we do not have all details of the project designed at the time of application for a construction permit.

In order to design an installation such as this, it is necessary to know all details about every item of equipment to be used, including such things as dimensions, weights, location of connections to other devices, electrical power and control requirements, steam and water flows, nature of materials of construction, etc. No manufacturer, whether he be a supplier of a small water pump or a large steam generator, can afford to provide reliable information of this type until he has actually received an order for his equipment. In order to buy an item of equipment, engineers must first specify the overall operating conditions and the general nature of the devices. With this kind of specification, bids are then invited on a competitive basis and analyzed. Afterward an order can be placed with a supplier and only then can the information necessary to design some other effected feature of the plant be obtained. In this situation, in order to design a power plant, the procedure is to specify and invite bids on the largest and most costly items that have the longest delivery and construction times. This procedure must begin at a point in time sufficiently ahead of the date at which the plant will be required. Steam generators and turbine-generators have lead times of four to five years. After this equipment has been ordered, the manufacturer can provide information that can be used to write specifications, invite bids and place orders for a

level of equipment that has somewhat less lengthy delivery and construction periods. After this level of equipment has been ordered, information from its suppliers is again used to specify the next level of equipment and so on. In the meantime, enough time may have elapsed that it is necessary to start building foundations for the first level of equipment and perhaps portions of the equipment itself, even though all components and features of the final plan have not yet been determined.

While this overlapping of construction and engineering activities may cause a small amount of uncertainty in some parts of the plans for some period of time, the procedure has one outstanding advantage. By not specifying and buying items of equipment until the point in time is reached when it is necessary, then any new developments in equipment designs can be incorporated in the bid specifications. In this way the latest available technology can always be incorporated into each system of the plant. If this had not been the case and we had had to specify our air quality equipment at the same time as the steam generator was specified, the newly emerging technology of wet scrubbers could not have been incorporated into the plant design because it had not been adequately demonstrated in early 1970 when the steam generator was ordered. Initial planning for this increment of generation began in 1968, making a total elapsed time from planning to finish of seven years.

Under these circumstances, it should be clear that many details of the design will not be known at the time that a construction permit must be applied for.

If a procedure were followed whereby all engineering, and there-

fore all equipment purchasing, was completed prior to the time that an application for a permit is submitted, then major investments would have to be made in engineering time and equipment orders that might not prove to be the most logical. Such a waste of resources is inconsistent with our responsibility to provide power to our customers at the lowest possible rate. Instead, in the case at hand, we followed the normal established procedure after discussing the schedule with State officials, and applied for our construction permit as soon as we had sufficient information about the air quality control equipment.

## ADEQUACY OF EQUIPMENT TO MEET EMISSION STANDARDS

The air quality control equipment we have proposed represents the latest technology in methods of collecting sulfur dioxide from flue gases. In fact, the emission limitation published in the Federal Standards of Performance for New Stationary Sources was predicated on the availability and use of wet scrubbing equipment. The federal government was required by law to publish standards that were consistent with adequately demonstrated technology. When the federal standard of 1.2 lbs of SO<sub>2</sub> per million Btu heat input was proposed on August 17, 1971, the EPA published a report entitled "Background Information for Proposed New Source Performance Standards". We are attaching Pages 8 and 9 of that report which state that flue gas cleaning for sulfur dioxide removal is an adequately demonstrated technology. When challenged in this regard, the EPA has stoutly defended the position that this technology is adequately demonstrated with more public statements, reports and correspondence than we can reasonably list. These federal emission standards are somewhat stricter than comparable State standards.

The ability of this kind of equipment to also meet the particulate removal requirements has been demonstrated on numerous nonutility applications, and more recently at the Dave Johnston power plant at Glen Rock, Wyoming.

Furthermore, our equipment specifications have very strong guarantee requirements that would expose the supplier to substantial financial loss if the proposed requirements are not met. Yet when we invited bids on this equipment, an adequate number of bidders accepted these guarantee requirements expressing the same confidence in their

ability to provide equipment to meet the standards as has been expressed by the EPA.

The performance level of this equipment will be maintained continuously because we will install all of the continuous monitoring devices listed in the EPA regulations. With the monitoring equipment in service, the Company can not have excursions of the standards that will go undetected.

Finally, should any element of the control equipment begin to show a mechanical malfunction, there will be no recourse to us other than reducing the load on the plant and repairing the equipment, because there will be no bypass installed by which flue gas can be passed around the control equipment. Maintenance can be performed with the plant in service because the scrubbing system will be modularized into three separate units that can be independently operated. With this arrangement, it will be possible to reduce the plant load and isolate and repair any troublesome portion of the system while continuing in service with the remaining modules performing at their normal level of efficiency.

Considering the foregoing, we are convinced that the equipment can perform initially and in continuous service with the specified efficiencies.

## SUFFICIENCY OF THE STANDARDS

Since the publication of the Draft Impact Statement there have been a number of public protestations that meeting the applicable standards should not be considered sufficient in spite of the statement on the adequacy of the standards on Page 12 of the Draft Statement. We would, therefore, like to address ourselves to this subject.

First, we point out that for the most part performance will be substantially better than applicable emission or ambient standards.

The federal emission standards, which are slightly stricter than comparable State standards, are based by law on whatever degree of emission reduction can be adequately demonstrated.

Furthermore, both the federal and State agencies that published ambient standards designed them so that they are more than just barely good enough. To quote from the Montana Ambient Air Quality Standards, Regulation No. 90-015, "The air quality standards listed describe a level of air quality designed to protect people from the adverse effects of air pollution; and they are intended further to promote maximum comfort and enjoyment in use of property consistent with economic and social well-being of the community". Further, the federal government in publishing national primary and secondary ambient air quality standards pointed out that their primary air quality standards define levels of air quality which protect the public health with an adequate margin of safety. They defined their more stringent secondary ambient air quality standards as levels of air quality which protect the public welfare from any known or anticipated adverse effects of a pollutant.

The Colstrip Project will meet whatever standards are the strictest

Since these standards are the judgment of the responsible federal and State agencies, they should be the basis of judging the performance of the plant.

## DISPERSION CALCULATIONS

After equipment was specified to limit emission rates to levels at or below allowable standards, calculations were made to predict the contribution of the proposed plant to ambient air quality levels. The Draft Impact Statement says the State also made such calculations and gives their results. The principal reason for making these calculations is to select a stack height. On the basis of our dispersion calculations, a 500-foot height was selected.

Most of the results reported by the State are well under any applicable standards, and our own calculations are in agreement on this point. However, there are enough differences between the State's results and our own that we are attaching the report of our consultant, W. L. Faith, for your reference. Dr. Faith, a longtime air pollution control officer of the County of Los Angeles, is well qualified in the field of dispersion modeling. His experience and association with similar experts employed by TVA, the AEC and others, help him to employ good mathematical techniques and sound judgment, and we rely greatly on his calculations. Even though both sets of answers appear favorable when compared to the ambient standards, we hope that as soon as we are able to submit the final meteorological report being prepared by researchers at Montana State University, we can review the two sets of dispersion calculations to identify any differences in procedure and preclude any future misunderstandings.

There is a prediction in the Draft Impact Statement with which we strongly disagree. This is the set of values predicted for SO<sub>2</sub> concentrations under fumigation conditions for periods of ten minutes, one hour and three hours. We have already submitted our predictions

for these conditions which are well under the applicable ambient standard, and we ask that our transmittal dated November 30, 1972, be considered a part of this statement. We understand that we are now in agreement with the State on the method of making calculations for these conditions. We recognize that some other set of meteorological conditions could be postulated that would give a different set of values than our own, but we are confident that any set of conditions that has actually been observed during the meteorological program would lead to a result that compares favorably with the applicable standard.

## TRACE ELEMENTS

While we would not disagree with the sentence in the Draft Statement that only a limited amount of knowledge about the trace element content of Colstrip coal is available, this situation is not abnormal. Coals throughout the country have not been examined extensively for trace element content for good reason, there has been no consensus on the part of the scientific community that trace element emissions from coal burning operations are likely to be harmful. The trace elements in coal are common in many other naturally occurring substances and are an essential ingredient in small quantities for many growing things. They change in nature from a necessity to a problem only when concentrations are unusually large. Consideration of emissions of these materials should not be made without also considering the final concentrations.

### Mercury

The Draft Impact Statement states that values of mercury in the coal range from less than .006 ppm to 0.7 ppm for the Rosebud seam. Other analyses indicate an average nearer to 0.3 ppm, but this includes concentrations as high as 6.25 ppm which have been found in the pyrite in the coal. Coal pulverizers reject pyrites. During tests conducted by our Company, 19 samples of coal were taken at the discharge of our pulverizers using Colstrip coal and were analyzed by Truesdail Laboratories. The average content was 0.076 ppm when corrected to the as-received moisture content. Corresponding samples of ash discharged from the boiler at the same time were isokinetically taken and analyzed for mercury. These tests showed 97% of the mercury in the coal appears in the ash and can be removed by ash collection equipment. This would mean that less than .002 lbs/hr of mercury will

be emitted from the two units combined. Resulting ground level concentrations would be in the order of  $.0000003 \mu\text{g}/\text{m}^3$ .

The EPA has stated concentrations of  $0.1 \mu\text{g}/\text{m}^3$  is well below the level at which health or welfare effects have been observed. We are attaching the applicable reports, calculations and correspondence to support our conclusions.

### Fluoride

The 19 samples referred to in the previous discussion were also analyzed for fluoride content. We have previously submitted the information that the average content was 4.2 ppm referred to the moisture content of the samples taken. We have been advised that subsequent tests on four samples have given higher values and that the values reported by different laboratories are not in agreement. We have no reason to disbelieve the results of the 19 samples we had analyzed. The importance of the information obtained from our tests is that the corresponding isokinetically taken ash samples showed at least 70% of the fluoride appearing in the coal also appeared in the ash and can be removed by ash collecting equipment. Any gaseous fluoride will be highly soluble and can be easily removed by the wet scrubber. These conclusions are consistent with references in the literature such as Pages 540 and 541 of Stern's "Air Pollution", Vol. III, where the use of alkali scrubbing systems is described for uranium ore and phosphate plants where uncontrolled fluoride emissions would be a problem. The importance of this is that when estimating emissions, full consideration should be given to the effects of collection equipment.

Due to the discrepancies in the previously reported fluoride tests,

we cooperated with your organization in taking additional samples under carefully controlled and standardized procedures. The samples were taken over the seven-day period from last December 16 to December 22. They were blended and split for analysis by the state and by our Company. Our portions are being analyzed by three different commercial laboratories, including Truesdail Laboratories. The results available to date are generally consistent between the various laboratories and average for the series about 22 ppm when corrected to the moisture content of the coal as received at the plant. We have attached all of the results available to this date and will submit a complete tabulation as soon as possible. We believe when you compare this tabulation with your own tests the results will be consistent.

Even if all the coal to be burned in the proposed plant had a fluoride content equal to the highest reported value, the fluoride emissions after considering the effect of the collection equipment would only be 8.3 lbs/hr based on particulate collection alone. At the average fluoride content, the emission would be 5.1 lbs/hr, and the resulting ground level concentration would only be .01 ppb compared to the ambient standard of 1.0 ppb or 1/100th of the State standard. Calculations showing this have been attached. If gaseous fluorides are also collected as can be expected, these numbers would be even lower.

#### Radioactivity

We have not tested for radioactive material in our coal and have no reason at this time to disagree with the values given by the State in the Draft Impact Statement.

We do, however, ask that recognition be given to the available

literature, such as Stern's "Air Pollution", Vol. I, Section 5, where it is reported that radioactive particles in coal burning operations associate themselves with the particulate matter, and therefore they can be removed by the collection equipment. By taking the values reported on Page 124, Line 3, for typical emissions and correcting those values for the radioactive content reported by the State and the degree of dust collection to be installed on the Colstrip Units, it can be concluded that radioactive emissions will be in the order of .047 grams per year of radium or equivalent. Our calculations showing this have been attached. For the Colstrip Project, the corresponding annual average ground level radioactivity would be in the order of  $9 \times 10^{-8}$  REM/yr. The AEC recognized limit of safe exposure is 0.5 REM/yr, or about five million times as much. The predicted amount for Colstrip could not be expected to cause a change in the naturally occurring radiation level of about .18 REM/yr. The exposure from the plants would be 500,000 times less than would be encountered in living in a wood-frame house in Montana.

## DRY VS WET COOLING TOWERS

All processes which convert heat energy to mechanical energy must reject heat to their surroundings in accordance with the laws of thermodynamics. The use of flow-through cooling is not possible with current water quality regulations so power plants must use some sort of cooling device to discharge waste heat to the atmosphere. The most commonly used device for this purpose is the evaporative cooling tower which has been used on thousands of industrial installations including several in Montana.

Dry type cooling towers, rather than evaporative type, have been considered for use on the Colstrip Project. Dry type towers are being developed in this and in foreign countries for use where water is not available in even the relatively small quantities needed by evaporative towers. The controlling factor in dry tower design is the dry bulb temperature, which is usually considerably higher than the wet bulb temperature that evaporative towers depend on. This means that where dry towers are used, the plant must have a lower efficiency thereby causing more fuel to be used for the same amount of electric generation and more heat to be discharged to the atmosphere.

In addition, dry type towers can not transfer heat as efficiently as evaporative towers so that for the same job a dry tower is much larger than an evaporative tower.

In terms of the Colstrip Project, these differences could cause:

1. About 15% poorer plant efficiency.
2. About a 13% reduction in plant capacity.
3. About five times as much land required for cooling towers.
4. About six times as much cost for cooling towers.

In addition, the most significant factor is that there is no accumulated experience anywhere, either in this country or abroad, in the use of dry cooling towers on power plants approaching the size of the Colstrip plants. Extrapolating the limited experience available on small plants to the Colstrip Project would be highly speculative. Based on the above, dry towers should not be considered an available alternative at this time.

## VISIBILITY EFFECTS

On Page 21, the Draft Impact Statement quotes paragraphs from the Department of Health, Education and Welfare publications discussing particulate and sulfur dioxide concentrations that coincide with certain visibility ranges. We would like to point out that for the lower visibilities to occur, the concentrations reported would have to be pervasive throughout an entire air basin such as the urban areas referred to. The conditions in these areas are caused by emissions from multiple sources. However, in the case of the Colstrip installation, which is a single point source, the estimated ground level concentrations are applicable only for single points in the area and would not at all be representative of the general air character. Therefore, the evidence cited to justify the conclusion that visibility might be reduced is not applicable to the Colstrip situation.

INDEX OF PAGES IN THE DRAFT STATEMENT AFFECTED  
BY THE FOREGOING MATERIAL

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3	Section 4, Paragraph 2	Introduction, Paragraph 2
10	Table 1	Diffusion Modeling & Trace Elements
11	Table 2 (Fluorides and Mercury)	Trace Elements
12	1st Paragraph, 1st Sentence	Dispersion Calculations
14	1st Paragraph & Table 4	Dispersion Calculations
16	Entire Page	Dispersion Calculations
18-19	Section 5	Trace Elements & Dispersion Calculations
21	Section 7	Visibility Effects
23	Section B	Adequacy of Equipment to Meet Emission Standards
29	2nd Paragraph, 5th Paragraph	Sufficiency of the Standards
34	Section B	Need for Power
37	Section VI	Introduction, Paragraph 2 and Need for Power

## SUMMARY

To summarize this statement, the following points have been made:

1. The project must be constructed to avoid a shortage of electric power.
2. The design procedure for a complex project is such that many details of the design can not be known at the time that a Construction Permit must be applied for.
3. The proposed air quality control equipment is capable of performing at the specified levels initially and in continuous operation.
4. The information published by public agencies describes the air quality standards as being compatible with the promotion of economic and social well-being and adequate to protect people from known or anticipated adverse effects of pollutants. The Colstrip Project will meet such standards.
5. There are technical but not significant differences between our predictions of ambient air quality contributions and those of the State. The only one in which compliance with an ambient standard is affected is the set of values for  $\text{SO}_2$  concentrations under fumigation conditions. Using the agreed upon techniques and current data, calculations show that the standard would be complied with.
6. Mercury, fluoride or radioactive emissions will not cause any problems particularly after consideration is given to the effect of the air quality control equipment.

7. Dry cooling towers are not a logical or feasible alternative for this project.
8. Visibility will not be noticeably affected throughout the area.

## LIST OF ATTACHMENTS TO THE STATEMENT

1. Background Information for Proposed New Source Performance Standards, Pages 8 and 9, Environmental Protection Agency, August 1971.
2. Letter, W. L. Faith to The Montana Power Company, December 29, 1972.
3. Letter, W. L. Faith to The Montana Power Company, December 6, 1972, with attached report entitled, Air Pollution Effects of Colstrip Unit #1.
4. Letter, The Montana Power Company to the Air Quality Bureau with attachments, November 30, 1972 (previously transmitted).
5. Report, Northern Testing Laboratories to The Montana Power Company, March 17, 1972, Lab. Nos. 22460 through 22478.
6. Report, Truesdail Laboratories to Northern Testing Laboratories, April 18, 1972, Lab. Nos. 22460 through 22481.
7. Letter, Environmental Protection Agency to Senator Clinton P. Anderson, June 25, 1971.
8. Trace Element Calculations by The Montana Power Company, undated.
9. Table, Fluoride ppm, Lab. Nos. 26883 through 26911, revised January 3, 1973.

The fact that most low-sulfur fuel oil or crude oil will have to be imported from Alaska or from foreign countries. Substantial quantities of desulfurized fuel oil will be available from Caribbean facilities, several of which will go on-stream in 1971 and 1972.

The fact that naturally occurring low-sulfur coal is restricted for the most part to the Rocky Mountain area, so that shipping costs to eastern and midwestern power stations can be appreciable. Coal-cleaning techniques can be used to remove substantial portions of sulfur and ash from some coals, but the processes are highly dependent on the make-up of the coal.

The fact that stack-gas desulfurization processes have only recently been developed to the point at which they can be applied to steam generators. The first new steam generators to be affected by the standards will be put into operation in 1975 and 1976. In many cases owners and operators can delay decisions on air pollution control equipment for a year or longer after the steam generator has been designed. At that time there should be a greater number of options for sulfur dioxide control schemes from which to choose.

## JUSTIFICATION OF PROPOSED STANDARDS

The proposed performance standards are based on inspections and tests of prototype and full-scale control systems, on consultations with state and local officials and operators and designers of steam generators and control systems, on EPA surveys of available combustion fuels, and on review of the literature. Essentially all of the technology applicable to the subject was developed in the United States.

The adequately demonstrated techniques include the use of electrostatic precipitators for particulate removal, low-sulfur fuels and flue-gas cleaning for sulfur dioxide removal, and combustion modifications for nitrogen oxides abatement. For the most part, these systems have been developed independently for each pollutant. The best systems for sulfur dioxide and particulate removal have not necessarily been operated on the same coal-fired steam generators. Many of the nitrogen oxides control techniques have been developed on units fired with low-sulfur fuel oil and natural gas, which had no requirements for sulfur dioxide or particulate control.

### **Particulate Matter**

The particulate limits are based primarily on EPA tests of existing electrostatic precipitators that were reported to have high collection efficiencies. Seven precipitator-equipped steam generators were tested during coal burning using the EPA test method. Two of the installations were shown to meet the particulate limit, and two more barely exceeded the limit at 0.21 pound per million Btu. At the most effective precipitators only a trace of the emissions was visible.

Tests of the one scrubber showed particulate emissions of 0.32 pound per million Btu. The marble-bed scrubber, however, was designed principally for SO<sub>2</sub> removal rather than high-efficiency particulate control. Information obtained from various pilot-scale test programs indicates that advanced scrubber designs can achieve the particulate standard of performance. Full-scale scrubbers are now being installed at large steam generators. They have been designed to meet particulate levels that are consistent with the standard.

W. L. FAITH  
2540 HUNTINGTON DRIVE  
SAN MARINO, CALIF. 91108

CONSULTING CHEMICAL ENGINEER

213-287-9383

December 6, 1972

Mr. D.T. Berube  
Montana Power Co.  
Electric Building  
Butte, Montana 59701

Dear Dan:

I am attaching a report showing the maximum ground-level concentrations of various pollutants that may be expected from the 2-360 mw units being constructed at Colstrip. An appendix to the report shows the methodology used in making the calculations. The maximum concentrations shown are well within all applicable Montana and Federal standards.

The actual emissions from the plant represent, in my opinion, best available technology.

Sincerely yours,



W.L. Faith

W. L. FAITH  
2540 HUNTINGTON DRIVE  
SAN MARINO, CALIF. 91108

CONSULTING CHEMICAL ENGINEER

213-287-9303

December 29, 1972

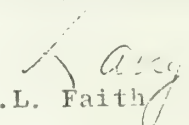
Mr. D.T. Berube  
Montana Power Co.  
Electric Building  
Butte, Montana 59701

Dear Dan:

For the record, in my report "Air Pollution Effects of Colstrip Unit 1" dated December 5, 1972, the particulate emissions shown in the Appendix (0.1 lb per million Btu/hr heat input) are those allowable under EPA regulations.

I understand that the emissions of particulate matter actually expected are 0.033 lb per million Btu/hr heat input. In that case, the maximum annual mean ground level concentration of particulate matter will be 0.039 ug/m<sup>3</sup>.

Sincerely yours,

  
W.L. Faith

## APPENDIX

### Pertinent plant design and operating data are:

2 - 360MW boilers each with a 500-ft stack<sub>6</sub>  
Heat input per hour per boiler -  $3410 \times 10^6$  Btu/hr  
Stack gas temperature -  $175^\circ$   
Stack gas velocity - 90 fps  
Stack gas sp.ht -  $0.259 \text{ Btu/lb/}^\circ\text{F}$   
Stack gas flow -  $4609 \times 10^6 \text{ lb/hr/stack}$

### Emissions data are:

$\text{SO}_2$  - 1.0 lb per million Btu/hr heat input  
 $\text{NO}_x$  - 0.7 lb (calc. as  $\text{NO}_2$ ) per million Btu/hr heat input  
Particulates - 0.1 lb per million Btu/hr heat input

### Plume rise calculations:

Taken from "Plume Rise" by G.A. Briggs, U.S. Atomic Energy Commission, 1969

Unstable and neutral - Briggs' Eq. 5.1  
Stable - Briggs' Eq. 5.7

where  $s = 2.22 \times 10^{-4}$  for Category E  
 $s = 4.71 \times 10^{-4}$  for Category F  
 $s = 5.99 \times 10^{-4}$  for Category G

### Dispersion calculations:

No inversion:

short-term glc - Turner's "Workbook" Eq. 3.3  
long-term glc - Turner's "Workbook" Eq. 5.13

With inversion(trapping):

short-term glc - Turner's "Workbook" Eq. 3.5

Inversion breakup (fumigation):

TVA inversion breakup model - see Eq. 3 "Principal Plume Rise  
Dispersion Models: TVA Power Plants", J. Air Poll. Control  
Assoc. Aug. 1971, pp. 491-495

### Correction factors

To change from concentrations derived from use of 10-minute  $\sigma_y$   
and  $\sigma_z$  values, multiply by 0.74 for one hour and 0.62 for 3-hours.

## AIR POLLUTION EFFECTS OF COLSTRIP UNIT 1

W.L. Faith

Consulting chemical engineer, San Marino, CA

Colstrip Unit No. 1 consists of 2-360MW coal-fired boilers each served by a 500-ft. stack. Other design and operating data, including emission data, are shown in the Appendix.

Calculated maximum ground-level concentrations (glc) of emitted pollutants are listed below (in comparison with applicable standards, if any)

	<u>Maximum glc</u>	<u>Applicable standard</u>
SO <sub>2</sub> - 1-hour	0.089 ppm	0.25 ppm
- 3-hour	193 ug/m <sup>3</sup>	1300 ug/m <sup>3</sup>
-24-hour	9.6 ug/m <sup>3</sup>	260 ug/m <sup>3</sup>
- annual mean	1.08 ug/m <sup>3</sup>	60 ug/m <sup>3</sup>
Particulates - 24-hour	1.0 ug/m <sup>3</sup>	150 ug/m <sup>3</sup>
- annual mean	0.1 ug/m <sup>3</sup>	60 ug/m <sup>3</sup>
Nitrogen oxides - annual mean	0.76 ug/m <sup>3</sup>	100 ug/m <sup>3</sup>
Mercury 24-hour	$3 \times 10^{-6}$ ug/m <sup>3</sup>	None (proposed -0.1 ug/m <sup>3</sup> )
Fluoride - 24 hour	<.002 ppb	1 ppb

(See Appendix for methodology of calculations)

San Marino, CA

December 5, 1972



CHEMISTS - MICROBIOLOGISTS - ENGINEERS  
RESEARCH - DEVELOPMENT - TESTING

4101 N. FIGUEROA STREET  
LOS ANGELES 90065  
AREA CODE 213 • 225-1534  
CABLE: TRUELABS

CLIENT Northern Testing Laboratories  
P.O. Box 411

525 St. John Avenue

SAMPLE Billings, Montana 59103

19 Samples of Coal and

3 Samples of Coal Ash as shown

P.O. NO. 6455-B55

INVESTIGATION

Analyses as requested.

DATE April 18, 1972

RECEIVED March 14, 1972

LABORATORY NO. 111340

## RESULTS

LAB. NO.	MERCURY, ppm	FLUORIDE, ppm
Coal Samples:		
22460	0.017	2.5
22461	<0.006	Trace <1
22462	0.028	Trace <1
22463	<0.006	5.
22464	0.024	Trace <1
22465	0.058	Trace <1
22466	<0.006	5.
22467	<0.006	3.
22468	0.109	5.
22469	<0.006	Trace <1
22470	0.016	Trace <1
22471	0.041	5.
22472	<0.006	11.
22473	0.104	Trace <1
22474	0.017	7.
22475	0.436	11.5
22476	0.023	4.
22477	0.113	9.5
22478	0.700	12.5
	<u>0.091</u>	<u>4.2</u>

(Continued)

(from Turner's "Workbook" p.38).

To correct for lower maximum glc brought about by use of 2 stacks and calculating plume rise from one stack only, multiply glc by 0.9. (See "Recommended Guide for the Prediction of the Dispersion of Airborne Effluents, ASME, 1968).

Data for 24-hour calculation:

Meteorological tower data indicate most persistent wind was 22 hours of Stability D and 2 hours of Stability C in a SE direction. Used Turner equation 5.13 and no corrections.

Data for annual mean calculation:

Meteorological tower data indicate greatest annual concentration will be in sector resulting from a NW wind, which occurs 11.1% of the time. Makeup of wind is essentially 3% Class C at 5.5 m/sec; 8% Class C at 8m/sec; 3% Class C at 10 m/sec; 9% D -5.5; 39% D-8; ;2% D-10; 3% E-5.5; 13% E-8; and 5% E-10. Class G was ignored as it would contribute little. The small amount of Class F was distributed between E and G classes.

Long-term X/Q values for each of the above were averaged on a weighted basis for various distances from stacks.

Highest average X/Q ( $1.13 \times 10^{-8}$ ) occurred at 10 miles. This value was multiplied by amount of total emissions in micrograms per second and by percentage of NW wind (11.1%) to yeild maximum annual concentration in micrograms per cubic meter.

Other sources of emission data

Mercury emissions - 0.002 lb/hr, based on experimental data showing that 97% of mercury in coal remains in ash.

Flouride emissions - 0.8 lb/hr, assuming 70% retention in ash.

ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

COPY  
ONS

June 25, 1971

Honorable Clinton P. Anderson  
United States Senate  
Washington, D. C. 20510

Dear Senator Anderson:

I regret that Mr. McGowan's earlier reply to your letter of June 3, 1971 regarding mercury emissions from the Four Corners power plant at Fruitland, New Mexico, was not fully responsive to your inquiry.

There is a paucity of actual measurements of mercury concentrations in the stack effluents and ambient air in the vicinity of this power plant. Samples of coal taken in May 1971 from the mine supplying all the coal for the Four Corners plant were analyzed by Environmental Protection Agency laboratories and by three outside laboratories. The analyses ranged from 0.3 ppm to 0.6 ppm by weight of mercury. In addition, the State of New Mexico has taken composite coal samples over a three month period. These samples have been sent to Lawrence Radiation Laboratory for analyses to include mercury content. Results will be available early in July.

The State of New Mexico has contracted with Environmental Sciences Associates, Cambridge, Massachusetts, to sample, among other things, the water input and effluent, the stack gases, and the ash for mercury. Results are not yet available but are also expected early next month.

New Mexico will also shortly begin a stack sampling program for mercury emissions from these units. The Environmental Protection Agency has provided sampling equipment for this study. We expect that the results of these analyses will be available in about a month.

Geomet Incorporated of Pomona, California, was retained by the Southwest Research Information Center, Albuquerque, New Mexico, to sample the power plant's stack gases. At the end of May, 1971, Geomet sampled the stack gas after it had passed through the precipitators and reported 80-120 nanograms (billionth of a gram) of mercury per cubic meter of stack gases. These values appear to be low and suggest that some of the mercury is collected with the particulate matter that is removed by the electrostatic precipitator or reacts with the materials in the fire box and boiler flues.

Assuming for purposes of discussion that coal fired at this plant contains an average of 0.5 ppm by weight mercury, that the plant is operating at full capacity, and that none of the mercury is caught by the precipitator or elsewhere in the system, the calculated mercury emissions would be 27 pounds per day. These estimates are as follows:

Unit No.	Operating Capacity Megawatts	Coal Burned tons/day	Mercury Emissions lbs/day
1	175	2,180	2.2
2	175	2,180	2.2
3	225	2,790	2.8
4	795	9,870	9.9
5	795	9,870	9.9
Total	2165	26,890	27.0

(Over)

<u>LAB NO.</u>	<u>MERCURY, ppm</u>	<u>FLUORIDE, ppm</u>	<u>Sulfur, %</u>	<u>Combustible Matter, %</u> (Loss on ignition)
COAL ASH:				
22479	0.276	57.5	5.83	0.48
22480	0.163	26.	0.87	0.48
22481	2.201	5.	0.85	0.25
	<u>0.88</u>	<u>29.5</u>		

#### METHODS OF ANALYSIS:

##### Mercury

Each sample was digested under reflux with nitric, sulfuric, and perchloric acid with sodium molybdate as catalyst. When digestion was complete, an aliquot of the solution was analyzed for mercury by flameless atomic absorption, using a special 10 centimeter cell. A National Bureau of Standards sample was analyzed by this with an accuracy of  $\pm 0.01$  ppm (Theory 0.13 ppm, found 0.125 ppm)

##### Fluoride

Accurately weighed samples (approx. 5 grams) were treated with saturated lime water in nickel crucibles. After drying at 105°C the crucibles were ignited at 550°C. The ash was transferred to special fluorine stills, sulfuric acid solution added, and steam distillation was conducted until 100 ml of distillate was collected. The distillate was then analyzed by the SPADNS method (colorimetric). The detection limit was 1 ppm.

##### Sulfate in Ash

Weighed samples were extracted with hydrochloric acid containing bromine. After filtration the sulfate was precipitated as barium sulfate and weighed.

##### Combustible Matter in Ash

The ash was dried at 105°C. Weighed samples were ashed in platinum dishes. The loss in weight was reported as % combustibles.

Respectfully submitted,

TRUESDAIL LABORATORIES, INC.

*Charles A. Crutchfield*  
 Charlie A. Crutchfield, Ph.D.  
 Technical Director

## TRACE ELEMENT CALCULATIONS

### I. Emission rate of fluorine and mercury

#### A. Fluoride

Average content of 19 sample run = 4.2 ppm

Average moisture of partly dried samples = 8.75%

Ash content equivalent to 4.2 ppm = 10.2%

Fluoride content of ash = 29.5 ppm

Coal equivalent =

$$\begin{aligned} 29.5 \times 10^{-6} \# \text{ F1/\# ash} \times .102 \# \text{ ash/\# coal} \\ = 2.95 \times 10^{-6} \# \text{ F1/\# coal} \end{aligned}$$

% F1 in coal found in ash

$$= \frac{2.95 \times 10^{-6}}{4.2 \times 10^{-6}} \times 10^2 = 70\%$$

Fluoride emission rate =

$$2 \times 385,500 \times 22.0 \times 10^{-6} \times (1 - .7) = 5.1 \#/\text{hr at the fluoride content of the 37 sample average}$$

#### B. Mercury

Average content of 19 sample run = .091 ppm

Mercury content corrected to 23.9% H<sub>2</sub>O

$$= .091 \times \frac{.761}{.913} = .076 \text{ ppm}$$

Mercury content of ash = 0.88 ppm

Coal equivalent =

$$\begin{aligned} 0.88 \times 10^{-6} \# \text{ Hg/\# ash} \times .102 \# \text{ ash/\# coal} \\ = 0.088 \times 10^{-6} \# \text{ Hg/\# coal} \end{aligned}$$

% Hg in coal found in ash

$$= \frac{0.088 \times 10^{-6}}{0.091 \times 10^{-6}} \times 10^2 = 97\%$$

Atmospheric diffusion calculations, based upon operational data from the power plant and meteorological conditions typical of the Farmington area, indicate that, under the most adverse meteorological conditions, mercury concentrations would not exceed 0.05 micrograms per cubic meter.

These concentrations may be compared to the threshold limit value of 50 micrograms per cubic meter that has been set by the American Conference of Government and Industrial Hygienists for industrial exposure over an 8-hour day, 40-hour week. Air quality standards for mercury have not been established, but based upon present medical evidence, 0.1 micrograms per cubic meter is well below levels at which health or welfare effects have been observed.

However, any emissions of a toxic substance are of concern to us, especially considering mechanisms by which they might enter the food chain. At the present time, our investigation of such mechanisms is only in the preliminary stages and no conclusions can be provided regarding the present issue.

With respect to the mercury content of fish from Navajo Lake, we can only speculate that some of the mercury emitted from this plant would find its way into the lake, but it is difficult to envision atmospheric emissions as the principal source.

Data in the Report on Mercury in the Environment, Geological Survey Professional Paper 713, 1970, indicate that the mercury content of sedimentary rocks in the Colorado plateau region which surrounds and includes the Four Corners area is extremely high. Such sedimentary rocks compose, or immediately underlie, more than 90 percent of the surface of the region. It may be that water entering the lake contains leached mercury.

As you may know, we have announced our intention to set National Emission Standards for three hazardous air pollutants: asbestos, beryllium, and mercury. The Clean Air Amendments of 1970 mandate that these standards be proposed by September 27, 1971. We are now in the process of assessing the sources and quantities of mercury emissions to the air, as well as available control techniques. Information to date indicates that on a national basis the combustion of fuel accounts for a substantial quantity of mercury emissions. However, as these sources are so widespread through the nation, no one source or area sources are believed to seriously affect the public health or welfare directly.

I hope this additional information is helpful. And I regret that it was not made available in our initial reply.

Sincerely yours,

/s/ William D. Ruckelshaus  
Administrator

# Radioactivity Calculations

From State Impact Statement:

Samples of coal tested contain

Radium pCi/g  
 Uranium 0.7 and 0.77 ppm  
 Thorium 3 and 1.74 ppm

Stern reports on 1000 MW plant without dust collection using coal containing:  
 1.1 ppm <sup>238</sup>U  
 2.0 ppm <sup>232</sup>Th

Plant emits:  $350 \times 10^{-3}$  curies <sup>228</sup>Ra from <sup>238</sup>U 0.79 ppm  
 $550 \times 10^{-3}$  curies <sup>226</sup>Ra from <sup>232</sup>Th 1.44 ppm

So 2 x 360 MW

would give:  $252 \times 10^{-3}$  curies <sup>228</sup>Ra corresponding to 0.79 ppm <sup>228</sup>U  
 $396 \times 10^{-3}$  curies <sup>226</sup>Ra corresponding to 1.44 ppm <sup>232</sup>Th

Now averaging State Impact Statement figures:

?U 0.7 and 0.77 0.735 ppm  
 ?Th 3.0 and 1.74 2.37 ppm  
 ?Ra 2.8 pCi/g  $2.8 \times 10^{-12}$  curies/gm coal  
 or  $2.8 \times 10^{-12}$  gm

So using our coal and Stern's Emission figures (99.5% particle collection)  
 $\frac{0.735 \text{ ppm}}{0.79 \text{ ppm}} (1.26 \times 10^{-3} \text{ curies/yr } ^{228}\text{Ra}) = 1.17 \times 10^{-3} \text{ curies } ^{228}\text{Ra}$

$\frac{2.37 \text{ ppm}}{1.44 \text{ ppm}} (1.98 \times 10^{-3} \text{ curies/yr } ^{226}\text{Ra}) = 3.26 \times 10^{-3} \text{ curies } ^{226}\text{Ra}$

Now Radium from our coal  
 385,500 lb coal/hr-unit

$9.23 \times 10^6$  24 hr  
 $3.37 \times 10^7$  365 day yr

Mass Radium emission/yr

$2.8 \times 10^{-12}$  curies/GM x  $\frac{454 \text{ gm}}{\text{lb coal}} \times 3.37 \times 10^7 \frac{\text{lb coal}}{\text{year}} = 4.28 \text{ curies year}$

Collection 99.5% efficient

0.0214 curies/yr escape

x 2 units  
.0428

Three sources and emission rates

<sup>228</sup>Ra  $1.17 \times 10^{-3}$  Curies/year

<sup>226</sup>Ra  $3.26 \times 10^{-3}$

? Ra  $42.8 \times 10^{-3}$

$47.23 \times 10^{-3}$  or 0.04723 curies/yr or 0.04723 gm Radium/yr

Mercury emission rate =

$$2 \times 385,500 \times 0.076 \times 10^{-6} \times (1 - .97) = .00175 \#/\text{hr}$$

## II. Ground level concentrations

- A. Fluoride - The published State standard is 1.0 ppb, 24 hr average.

MPCo. prediction of  $\text{SO}_2$  glc = 0.004, 24 hr average.

$$\text{GLC (ppm HF)} = \text{ppm SO}_2 \times \frac{\text{moles/hr fluoride (as HF)}}{\text{moles/hr SO}_2}$$

$$= 0.004 \times \frac{5.1}{\frac{19}{\frac{6820}{64}}} = 11 \times 10^{-6} \text{ ppm}$$

$$= 0.011 \text{ ppb}$$

- B. Mercury - No standard published.

EPA states  $0.1 \mu\text{g}/\text{m}^3$  a safe value.

$$\text{GLC } (\mu\text{g}/\text{m}^3 \text{ Hg}) = \mu\text{g}/\text{m}^3 \text{ SO}_2 \times \frac{\#/\text{hr Hg}}{\#/\text{hr SO}_2}$$

$$= 11.0 \times \frac{.00175}{6820}$$

$$= 0.28 \times 10^{-5} = 0.0000028 \mu\text{g}/\text{m}^3$$

Calculations continued on the following page.

Source "The Atomic Energy Deskbook" by John F. Hogerton  
1963 Consultant to Arthur D. Little Inc. Pg. 59

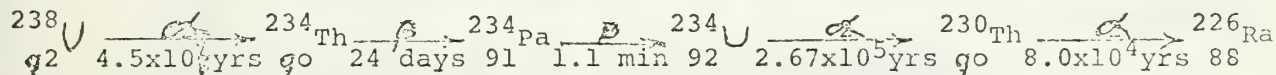
"Source Book on Atomic Energy" - Samuel Glasstone 1958 Pg. 596

Estimated in most parts of U.S. individual receives about 0.14-0.16 roentgen per year due to natural radiation. NOTE - This figure is before the large weapons tests during 1958-1962 time period.

Maximum permissible dose (X-rays) 0.3 R per week  
Exposure to public at rate 0.5 R per year

U.S. Atomic Energy Commission Code of Federal Regulation  
Title 10 Part 20 US AEC 1963

#### Decay Chain



$$\frac{0.04723 \text{ gm/yr}}{3.15 \times 10^7 \text{ sec/yr}} = 1.50 \times 10^{-9} \text{ gm Radium/sec}$$

#### Annual concentration (GLC)

Annual SO<sub>2</sub> concentration predicted as  $7.86 \times 10^{-7} \text{ g/m}^3$   
 Produced by 860 GM SO<sub>2</sub> emitted per second (2 units)

$$\frac{7.86 \times 10^{-7} \text{ gm SO}_2/\text{m}^3}{860 \text{ gm SO}_2/\text{sec}} \times 1.50 \times 10^{-9} \text{ gm Radium/sec} = \frac{1.37 \times 10^{-14} \text{ gm Radium/m}^3}{\text{Radium/m}^3}$$

#### 24 Hour concentration

$$\frac{.004}{.0003} (1.37 \times 10^{-14}) = 1,825 \times 10^{-13} \text{ gm Radium/m}^3$$

#### Annual exposure

$$(1.37 \times 10^{-14} \text{ gm Radium}) \times 7.5 \times 10^2 \frac{\text{R}}{\text{gm-hr}} \times 24 \text{ hr} \times 365 \frac{\text{day}}{\text{yr}} = \underline{\underline{9 \times 10^{-8} \text{ rem/yr}}}$$

#### 24 Hour exposure

$$(1.825 \times 10^{-13}) (7.5 \times 10^2) \times 24 \text{ hr} = 3.29 \times 10^{-9} \text{ rem/24 hr}$$

To put these figures into perspective

PG&E licensed to discharge at Humboldt Bay, California  
 52 MW Nuclear Plant      0.05 curies/second

Commonwealth Edison - Morris, Illinois  
 185 MW Nuclear Plant      0.7 curies/second

NOTE - In calculating the permissible discharge rate, the physical and biological characteristics of the radioactive gases and meteorological characteristics of the site are taken into consideration (AEC).

#### Background Radiation

Cosmic Rays (Sea level)	30 <sup>1</sup> millirem/yr
Natural Radioactivity	
External <sup>2</sup>	100
Internal <sup>3</sup>	50
	180 x 10 <sup>-3</sup> rem/yr

<sup>1</sup> Compares with 70 millirems at 5000 ft

<sup>2</sup> From Uranium, Thorium, and associated decay products in earth's crust or atmosphere

<sup>3</sup> From Potassium 40, Radium, and its decay products, and Carbon -14 in the body

F L U O R I D E , P D M																					
TRUESDAIL				WESTERN APPLIED RESEARCH				RADIATION CORPORATION				% MOISTURE				% ASH					
Lab No.	Identification	Date Sampled	As		Oven		As	Air		Oven		As	Air		Oven		As	Air		Oven	
			Rec'd	Dry	Rec'd	Dry		Rec'd	Dry	Rec'd	Dry		Rec'd	Dry	Rec'd	Dry		Rec'd	Dry	Rec'd	Dry
26683	Pulverizer	12/16/72	24.1	25.8	27.7		27.9	29.8	32.0	12.9	6.4	7.0	9.8	10.4	11.2						
26684	Belt	12/16/72	11.4	13.5	15.4	26	35.7	42.4	48.3	26.1	15.8	12.3	8.7	10.3	11.7						
26685	Belt	12/16/72	8.3	9.7	11.2	26	22.4	26.1	30.2	25.7	14.1	13.6	8.2	9.6	11.1						
26686	Belt	12/16/72	12.2	14.0	16.4	25	27.1	31.2	36.8	26.2	13.0	15.1	7.3	8.4	9.9						
26687	Belt	12/16/72	10.8	12.3	14.5	25	29	34	34	26.7	25.7	12.1	15.4	8.4	9.6	11.3					
26688	Belt	12/16/72	10.4	12.1	14.2	34	40	46	46	33.6	25.8	15.2	12.5	8.2	9.7	11.1					
26689	Belt	12/16/72				30	35	41	41	29.3	26.5	13.8	14.8	7.7	8.9	10.5					
26690	Pulverizer	12/17/72					25.5	26.8	29.1	12.6	5.0	8.0	10.0	10.5	11.4						
26691	Belt	12/17/72	13.2	15.4	17.3		19.2	22.4	25.1	23.8	14.5	10.8	8.0	9.4	10.5						
26692	Pulverizer	12/18/72					23.3	24.0	26.7	12.8	3.0	10.1	9.7	10.0	11.1						
26693	Belt	12/18/72	4.9	5.8	6.7		28.1	33.0	38.2	26.5	15.0	13.6	8.1	9.6	11.1						
26903	Pulverizer	12/19/72					32.4	33.3	36.3	10.9	2.7	8.4	10.5	10.8	11.8						
26904	Belt	12/19/72	18.8	21.3	25.2		23.2	26.2	30.9	25.2	11.6	15.4	8.6	9.7	11.5						
26905	Pulverizer	12/20/72	8.5	8.7	9.4		34.8	35.5	38.2	9.0	2.0	7.2	10.7	10.9	11.8						
26906	Belt	12/20/72					23.9	28.7	31.9	25.2	16.7	10.2	9.8	11.8	13.1						
26907	Belt	12/20/72	4.6	5.7	6.3		26.4	31.6	35.1	24.7	16.3	10.1	9.9	11.8	13.1						
26908	Belt	12/20/72					23.3	27.6	31.2	25.1	15.4	11.5	9.1	10.8	12.2						
26909	Belt	12/20/72					27.0	32.2	36.2	25.3	16.0	11.0	8.4	10.0	11.3						
26910	Belt	12/20/72					23.5	28.0	31.3	25.0	16.2	10.5	8.9	10.7	11.9						
26911	Belt	12/20/72					29.5	35.7	39.6	25.4	17.4	9.8	8.9	10.7	11.9						
Avg. of Belt Samples			10.5			27.7	25.6			25.5											
Avg. of Pulverizer Samples			16.5			-	28.8			11.6											

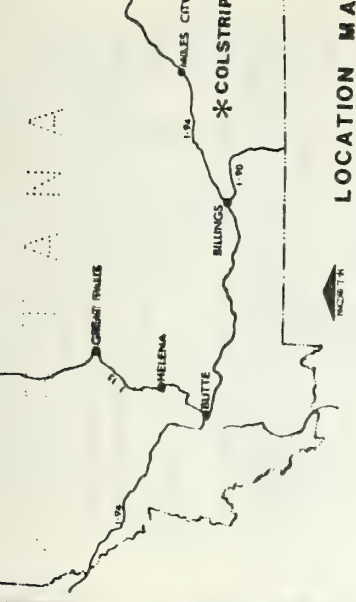
Belt samples referred to field average moisture (23.4%)  
Pulverizer samples referred to field avg. moisture (23.4%)  
Overall Average 57 tests:

22.1

Revised Jan 3, 1973



# the plan for colstrip montana



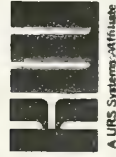
## INTRODUCTION

This pamphlet presents a resume of the Plan for Colstrip, Montana, a company town owned and operated by Western Energy Company. Colstrip is located in southeastern Montana 30 miles south of Interstate 94 in Rosebud County. The town planning area is located between Highway 315 on the west and the Burlington Northern Railway lines on the east. Western Energy's property limits determine north and south boundaries of the planning area.

Expansion of mining operations and development of a steam electric generating plant by the Montana Power Company will stimulate growth and the need for additional housing, streets and other urban facilities. The Plan proposes a reasonable, ambitious development program which will benefit Western Energy from the standpoint of economics, public relations and employee relations. In addition, the following benefits can be expected:

- (1) Minimal employee turnover can be achieved by compensating for Colstrip's geographical isolation with an attractive and functional community. Good educational and recreational opportunities, comfortable and attractive living quarters and ready access to commercial facilities will go far in fostering satisfaction among employees and their families.

**WESTERN ENERGY COMPANY  
BUTTE, MONTANA**



**RS / THE KEN R. WHITE COMPANY**  
 Mailing Address: P.O. Drawer 6277 B • Denver, Colorado 80206  
 155 East Exposition Avenue • Suite 300 • Denver, Colorado

- (2) Higher employee morale and job performance should result from pleasant living conditions.
- (3) Public relations of Western Energy can be enhanced by developing Colstrip as a model community and avoiding the historic image of the "company town". This concern together with reclamation of mined land are in the best interests of Western Energy Company.

## SUMMARY OF THE PLAN

The fast growth rate projected for Colstrip by 1980 required that the Plan for Colstrip be flexible. The construction of homes, streets and other facilities must keep pace with the population influx and must adjust to any unforeseen alterations in the growth rate. Therefore, the concept of the Plan provides for future growth to develop in separate "pockets" surrounded by open space. This concept allows for physical growth to occur in one of several areas at a time, depending on the demand for housing. Three types of housing (single-family, apartments and mobile homes) also provide flexibility to meet the different housing needs of the population.

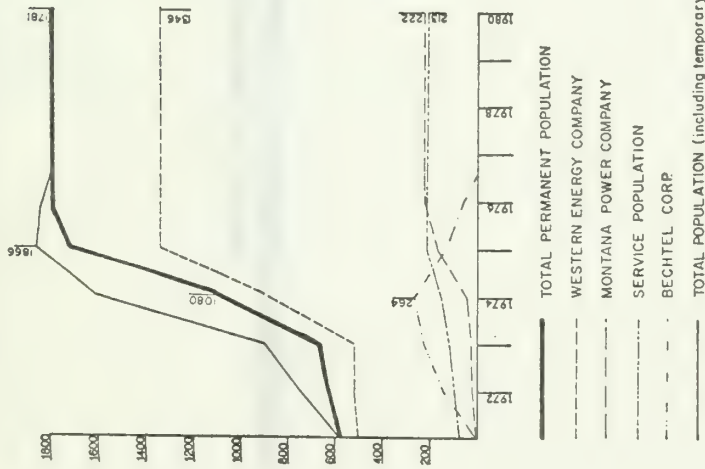
The following summary reviews population projections for Colstrip and major elements of the Plan: housing, commercial, community facilities, traffic and utilities.

## POPULATION

Colstrip's population is projected to grow to 1,780 by 1980, several times the current population. The following table and graph illustrate the yearly incremental increases in population.

POPULATION GROWTH BY GROUP				
Year	WECO.	MPCo.	Services Total	Becthel TOTAL
1972	522	17	91	140
1973	522	25	118	228
1974	885	42	153	264
1975	1346	177	213	130
1976	1346	222	213	63
1978	1346	222	213	0
1980	1346	222	213	1781

## Population Growth



Projections were based on the following factors:

- (1) Current census of Colstrip's population;
- (2) Estimate of temporary construction employees and their families expected to live in Colstrip during construction of the steam electric generating project;
- (3) Projected personnel and their families of Western Energy and Montana Power;
- (4) Estimate of professional and commercial personnel required to serve professional, commercial and service businesses in Colstrip; and
- (4) Factors establishing the single/married employee ratio and average family size.

Recommendations for relating the population growth to development of the town are as follows:

- (1) Establish a system for monitoring population growth to keep abreast of changes in housing and other needs.
- (2) Inform the school district of anticipated population changes and other demographic information pertinent to school planning needs.

## HOUSING

Colstrip's rapid population growth requires a flexible housing plan. Construction must keep pace with the growth rate and be flexible to changing housing requirements and mix of housing types. To achieve flexibility, each new residential section is separate and surrounded by open space. Therefore, construction can vary from development of one section at a time to simultaneous construction of all sections. If the single/married ratio varies during a growth period from the projections, adjustments in the construction of apartments and single-family homes can also be accommodated. The following table relates projected population and households to anticipated housing requirements.

INCREMENTAL INCREASE OF  
HOUSEHOLDS AND DWELLING UNITS  
Colstrip, Montana

Year	Households	Dwelling Units by Type			Total
		N. Fam.	Sing. Fam.	Mo. Home	
1972	230	38	64	128	230
1973	274	46	91	128	265
1974	412	61	199	128	388
1975	562	83	273	128	484
1976	551	95	273	128	496
1978	529	95	273	128	496
1980	529	95	273	128	496

Single-family homes are planned for three areas: (1) north of and adjacent to the existing single-family area in the northeastern part of the existing town, (2) in the southern part of the planning area between Highway 315 and the proposed mobile home park, and (3) north of the school to the limit of the planning area. Apartments are planned for the areas southwest and adjacent to the existing town and between the new mobile home park and the new single-family section to the south. The new mobile home park is planned south of the existing mobile home park and adjacent to the rail line.

Single-family homes should be located on lots with sufficient building setbacks to provide sufficient space between homes and to avoid a crowded appearance. Variation of setbacks for groups of houses can avoid a monotonous building setback appearance, particularly on long, straight streets. Variety in the styles of homes between each residential section can do much to provide variety in the visual appearance of neighborhoods. Predominant types of landscaping in each residential section will also enhance the visual appearance of neighborhoods.

Town house and garden apartments are recommended for new multi-family areas. Dwelling unit densities should range from 6 to 14 units per net acre for town houses and 15 to 20 units per net acre for apartments. Major design factors in developing multi-family areas are: (1) low land coverage and abundant open space, (2) privacy and quiet for the individual family, (3) adequate and convenient off-street parking for tenant's cars, and (4) convenient community shopping and recreation facilities.

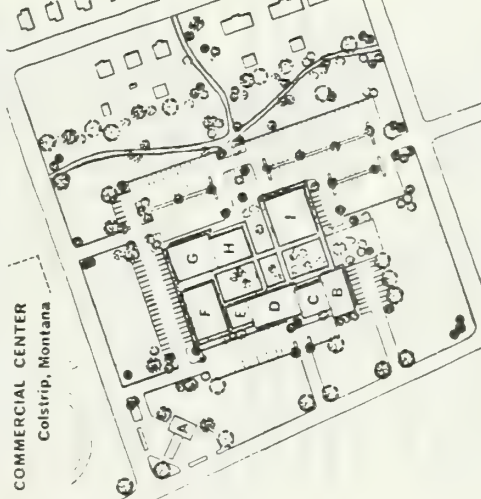
## COMMERCIAL

Commercial development is planned for the area south of Main Street across from the school. The site is centrally located to serve both the community and highway traffic.

The proposed complex resembles a small neighborhood shopping center and consists of a grocery store, drug and hardware store, general merchandise store, offices, medical facilities, a post office and space for services such as a laundromat and beauty and barber shops. A service station, small motel and restaurant are located on the site and are oriented toward the highway. A recommended development plan for the commercial center is illustrated below.

Careful consideration should be given to design and aesthetics of the center as it is a major element in the future image of Colstrip. A market study should also precede development of the center to derive spatial requirements and quantity and range of merchandise.

COMMERCIAL CENTER  
Colstrip, Montana



- A. Service Station (14,000 sq.ft.)
- B. 20 Room Motel (3,825 sq.ft.)
- C. Restaurant (2,025 sq.ft.)
- D. General Office Space (3,375 sq.ft.)
- E. Medical-Dental Office (1,089 sq.ft.)
- F. Drug-Hardware Store (3,666 sq.ft.)
- G. General Merchandise (3,575 sq.ft.)
- H. Commercial Services (2,475 sq.ft.)
- I. Grocery (4,875 sq.ft.)
- J. Future Expansion (optional)

## COMMUNITY FACILITIES

Colstrip's community facilities include the school, fire and police protection services, churches, health care, library and parks and recreation services. Fire protection and parks and recreation are the primary responsibility of Western Energy; the other facilities are public or quasi-public facilities.

**SCHOOLS** — Although provision of additional school facilities is a public function, Western Energy should inform school officials of Colstrip's anticipated impact on school enrollment so appropriate action can be taken for school expansion. The present site can accommodate additional buildings, but additional playground and recreation space may be required. Agreements between Western Energy and the school district can bring about the mutual use of school recreation facilities and the proposed park north of the school site.

## FIRE AND POLICE PROTECTION SERVICES

Fire protection will be a responsibility of Western Energy. A fire station is recommended to be constructed along Willow Street where ready access to the community and the Montana Power facility will be available. Police protection will be provided by Rosebud County. If an office is required, it should be located at the fire station or in the commercial center complex.

**CHURCHES** — Two additional church sites are provided in the Plan. Both sites are in new residential areas. If new churches do not organize, they can be converted to additional residential lots.

**HEALTH CARE AND LIBRARY SERVICES** — Western Energy's primary responsibility for assisting with health care and library services is to provide sufficient space. A combination doctor and dental office is recommended as part of the commercial complex. Library services will be provided through a bookmobile from Billings, Montana. Therefore, no permanent space will be required for this service.

**PARKS AND RECREATION** — The plan for parks and recreation consists of the following elements:

- o Landscaping of the existing park.
- o Development and expansion of the proposed teen and community center.
- o Development of new playfields, tot lots and parks within the open space.
- o A bicycle path constructed throughout the open space and connecting the parks with major areas of the town.
- o Additional facilities (a golf course and community recreation area), which are planned for areas beyond the limit of the planning area.

#### **TRAFFIC**

The thorough fare plan incorporates the existing street system and the development of new streets. The plan establishes three categories of thoroughfares which are:

- (1) Major Thoroughfares — which carry through traffic and are designed to move traffic with minimal congestion.
- (2) Collector Streets — which connect one area of the community with another.
- (3) Local Streets — which provide access to individual land parcels and are designed to encourage slower speeds.

Major thoroughfares are Main Street and Willow Street. Plans call for the termination of Main Street at the rail lines and the extension of Willow Street to the east across the rail tracks and to the west to connect with Highway 315. A grade separation will be required at the rail line crossing.

Collector streets are First, Second and Third Streets, which extend into areas of future development. Another collector extends south from the commercial center through the apartment area and into the single-family area. It will connect with Willow Street and Highway 315. First Street extends to the north and intersects with the extension of Third Street. Second Street serves the existing mobile home area and extends south into the proposed mobile home park. Third Street continues north of its present alignment and connects with Highway 315.

The remaining streets on the Plan are local streets. They are usually shorter than the other streets and are designed to provide access to individual lots. Pavement is narrow and curves are shorter to encourage slower speeds.

It is recommended that Highway 315 remain in its present location and that Western Energy and Montana Power petition the Highway Department to place the highway on a schedule for resurfacing and widening of the pavement. The present road is dilapidated in some areas and presents a safety hazard. An overpass is also recommended for the highway over the proposed road and rail line which will serve new mining areas to the west.

#### **UTILITIES**

Storm drainage, sewage and water supply are the major utilities to be provided in Colstrip. Several conditions should be given careful attention to insure smooth operation and functioning of these basic urban facilities. To this end the following recommendations have been made:

#### **DRAINAGE**

- (1) Western Energy should conduct a study to define flooding potentials of Armells Creek, particularly in that area within the community.

- (2) A water storage basin should be provided in the existing park to handle any excessive drainage loads created by new development to the north. The basin,

which normally would be dry, collects water during heavy storms and avoids construction of large drainage structures adjacent to the railroad down to Armells Creek.

- (3) Utilize landscaping and the above basin principle in new development areas and in parks and open spaces wherever drainage may become a problem.
- (4) Carry excessive surface runoff from the commercial center south to the Armells Creek tributary located in the planned open space within the multi-family area. The drainage should be handled in a subsurface system.

#### **SEWAGE**

- (1) The capacity of the existing lift station should be increased if new development south of Willow Street overloads the existing system.
- (2) Additional sanitary sewer facilities should use pipe systems with flexible gaskets at joints to avoid infiltration.
- (3) The lagoons planned for sewage treatment should be designed for up to 120 days' storage capacity.
- (4) Western Energy should keep abreast of changing Federal requirements affecting sewage treatment and treatment discharges.
- (5) Land disposal of treated effluent should be considered.

#### **WATER**

- (1) Western Energy should plan to provide a yearly water consumption of 400 acre-feet by 1980 — an additional 263 acre-feet of water per year over present supply of 137 acre-feet per year.
- (2) Present areas served by four-inch mains should be replaced or at least paralleled with six-inch mains in order to maintain desired pressure and to meet fire department requirements.

# The MONTANA POWER COMPANY

RECEIVED  
1972  
ENVIRONMENTAL SCIENCES  
DIVISION

GENERAL OFFICES  
ELECTRIC BUILDING  
BUTTE, MONTANA 59701

October 9, 1972

Mr. Ben Wake  
Administrator  
Dept. of Health and  
Environmental Sciences  
State of Montana  
Helena, MT 59601

Dear Sir:

In response to your inquiry made by Don Holtz as to specific dates that certain activities were undertaken by The Montana Power Company in the Colstrip area, I submit the following chronology of the activities and developments of our Colstrip project.

- 1969 - July - Negotiated the Technical Services Agreement with Bechtel Corporation to evaluate turbine generators and boiler additions to The Montana Power Company's system, initially planned for the Billings plant.
- Sept.- Placed an order for the first turbine generator set with General Electric Co.
- Dec. - Placed an order for the first steam generator with Combustion Engineers.
- 1970 - Mar. - Contracted with Bechtel Corporation for an engineering evaluation of potential coal fired steam electric generating sites throughout The Montana Power Company area. Previously planned addition to the Billings plant had been abandoned because of the local weather patterns, metropolitan development of the area and public attitude. The final Colstrip location was selected over 6 other sites in the Colstrip area, and 15 other locations on The Montana Power Company system, after complete environmental and economic evaluations.

- July - Surveys of potential cooling ponds in the general area - three on Stocker creek drainage - one each on Armells, Cow, and Pony creek drainage areas.
- Sept.- Soils and subsurface strata evaluation on four of the above sites by drilling 13 tests holes and digging 15 exploratory trenches.
- 1971 - Jan. - Colstrip site test hole drilling commenced for soil and subsurface strata evaluation.
  - Installed a mechanical weather recording station and a recording hygrothermograph near the proposed site.
  - Contracted with Western Scientific Services Incorporated to investigate weather records for the Colstrip area and establish a complete weather station at the location.
  - Engaged W. L. Faith, Consulting Chemical Engineer, to evaluate meteorological data, plant design and equipment selection pertaining to air quality control.
- June - Expanded weather investigation and retained Montana State University through their Endowment and Research Foundation to establish long range meteorological program.
- July - Commenced drilling a 9,330 ft. test well to evaluate subsurface aquifers for possible water source for plant water requirements.
- Aug. - Design was finalized for the 350 ft. weather observation tower and erection was completed in November.
- Sept.- Began discussions with Montana State University through their Endowment and Research Foundation for development of a program to evaluate the effects of the Colstrip project on the existing ecosystems of the area.
- Nov. - Excavation for removal of coal underlying plant site commenced.
- 1972 - Jan. - Installed first air quality monitoring station consisting of an SO<sub>x</sub>, NO<sub>x</sub> sampling train, a high volume dust sampler, dustfall jar, Huey sulfation plate and a fluoride plate.
- June - First concrete poured - drilled caisson footings.

- Aug. - First surface placement of concrete grade beams on top of caissons.

In addition to above events, construction at the Colstrip site to date has consisted of:

Drilling a water well and installing a water system.

Erection and operation of a concrete batch plant.

Start of construction buildings - structures and placement of utilities for an office, warehouse, worker's change house and a maintenance building.

Building of access roads and subgrade for a railroad site.

Placement of the 840 yard pedestal base for Unit #1 turbine generator.

With the completion of all the caissons, Unit #1 foundations and grade beams, and site fencing expected by the first part of December, construction activity will be suspended until spring.

Yours very truly,



Carl R. Anderson, Mgr.  
Environmental Protection Dept.

CRA:mcs



# *The* MONTANA POWER COMPANY

Jan 19

GENERAL OFFICES  
ELECTRIC BUILDING  
BUTTE, MONTANA 59701

January 18, 1973

Air Quality Bureau  
State Department of Health and  
Environmental Sciences  
Helena, MT 59601

ATTENTION: Don Holtz, Chief

RE: Draft Environmental Impact  
Statement Pertaining to the  
Colstrip Generating Plant

Gentlemen:

We have received and reviewed your draft Environmental Impact Statement dated October, 1972, relating to our application for a construction permit for the installation of equipment which may cause or contribute to air pollution. We have also reviewed your Draft Supplement, dated December, 1972, to that Statement.

Your statement refers to the ownership as a "joint venture" of The Montana Power Company and Puget Sound Power and Light Company. Actually, the parties are owners as tenants in common and it is technically not a "joint venture."

By letter to you of November 7, 1972, we submitted specific comments on your predictions of ground level concentrations of sulfur dioxide set out in the draft statement. A copy of our letter is attached as Item 1. We have also submitted specific comments on other areas of the draft statement by letter dated November 30, 1972, and December 29, 1972. Copies of those letters are attached as Items 2 and 3. Further, at the public hearing held by the Department in the Custer County High School auditorium in Miles City on January 5, 1973, representatives of both The Montana Power Company and Puget Sound Power and Light Company made oral presentations concerning the statement. A copy of the statement of Puget Sound Power & Light Company is attached hereto as Item 4, and The Montana Power Company's statement is attached as Item 5.

Now that we have completed our review of your draft statement and supplement, as well as those comments by others where copies have been furnished to us, we have the following additional comments on the statement and supplement as a whole:

1. Additional Information. In some instances, the draft statement tends to set out conclusions without stating the facts upon which those conclusions are based. For example, the social consequences discussed in the section of the draft statement dealing with the impact on the human environment seem to be predicated on the development of vast number of generating plants and mines and not on the construction and operation of the facilities for which application has been made.

We believe that elaborating on the facts pertaining to our proposed facilities would dispel what appear to us to be a number of erroneous conclusions. To further this end of making the draft statement more factual, we recommend that you consider the following preliminary studies and incorporate them in the statement as you see fit:

A. Meteorological Study

Montana State University is pursuing a long range meteorological investigation at Colstrip. A permanent weather station was established in 1971 and a 350 foot tower was erected to monitor wind and temperature up to that height. Higher altitude data has been obtained with balloons and aircraft. A full year of weather information has now been collected, and copies of that data have been submitted to your Department. Correlation between the tower information and the high altitude data is being pursued as well as their relationship with regional meteorological data. The Department may wish to supplement this study with data obtained from the National Weather Service at Billings, Miles City, or Sheridan, Wyoming.

B. Environmental Surveillance Study

Montana State University Agricultural Experiment Station has undertaken an evaluation of the existing conditions of the total environment in the area so as to establish a pre-project base. The University is investigating the vegetation and soil chemistry, vegetative communities, vegetative growth (including fodder production which is of major concern to the local cattle industry), insect and animal communities and chemistry, surface and ground water chemistry, etc. Copies of the Experiment Station's "proposal" and "Preliminary Study Report" are attached as Items 6 and 7. The Experiment Station has prepared a study entitled "Range Types and Productivity of Two Study Areas in Southeastern Montana". This study was prepared for Western Energy Company, a subsidiary of Montana Power, and relates to certain areas described in that study. We have attached a copy of this study as Item 8.

#### C. Historical Values

An archaeological study was conducted by the University of Montana Anthropology Department under the direction of Dale Fredlund, State Archaeologist, during 1971. This study included all of the lands which will be part of the project during the development and early years of operation of the project. Arrangements are being made to expand the study to include lands that will be affected by mining activity in the later years of the project. A copy of the University of Montana's Archaeological Survey Report is attached as Item 9.

#### D. Community Planning

Ken R. White Company, Denver, Colorado, Land Use Planners Designers, and Architects has prepared a preliminary report on the development plan and program for Colstrip. This report investigates employment, population forecast, recommends housing plans, commercial facilities, community facilities, recreational facilities and utility requirements, and sets forth a general land use and circulation plan for the community and adjacent area. The final draft of this report has not yet been received, but will be sent to you when received.

#### E. Wildlife Habitat Utilization

This preliminary report has been developed for a limited area within the project by Ecological Consulting Service. The report essentially deals with a specific control area and is currently being expanded to include the entire project area. The initial summary of this activity is attached as Item 10.

#### F. Coal Mine Land Reclamation Research

The Montana Agricultural Experiment Station has conducted research in this area since 1968. The study has examined many aspects of reclamation requirements and has lead to the development of a successful reclamation program. A copy of Experiment Station's Research Report #20 is attached as Item 11.

#### G. Stream Flows and Water Data

The project as applied for will require approximately 8000 acre ft/yr, at rates up to a maximum of 8000 gpm. That maximum rate will be about 0.2% of the average flow rate of the Yellowstone River. Information pertaining to stream flows and other water data could be obtained from the U.S. Geological Survey, such as in their Special Publication 28, "Mineral and Water Resources of Montana", and also from the U.S. Bureau of Reclamation, the Corps of Engineers, and other governmental agencies. The applicants have retained Ecological Consulting Service of Helena, to more fully evaluate the water use and hydrology of the Yellowstone River, and what effects, if any, this minor diversion may have on the downstream characteristics of the river.

2. Need for Power. The draft statement makes reference to the need for electric power which necessitates the construction of the proposed project. Nowhere in the draft statement, however, is this need quantified. Therefore, we have attached as Item 12, a summary of the projected loads, resources and deficiencies of the applicants through 1982 which should be included in the statement. This summary is developed on the same basis as data provided by the applicants to the Western Systems Coordinating Council for its annual publication "Summary of Estimated Loads and Resources".

3. Environmental Impact of Realistic Alternatives. In the section of the draft statement dealing with alternatives to the proposed project, nine alternatives are listed. Under the National Environmental Policy Act, upon which the Montana Act is modeled, the courts have indicated that "the range of alternatives that must be discussed in an impact statement is generally limited to realistic alternatives that will be reasonably available within the time the 'decision making' official intends to act." NRDC v. Morton, 2 ELR 20029 (D.C. Cir. 1972). Such a standard rules out at least the following alternatives which are discussed in the draft statement: nuclear fusion, magnetohydrodynamics, solar energy, wind, and geothermal energy.

Furthermore, the environmental impact of none of the alternatives set out in the draft statement is discussed. We recommend that the draft statement be supplemented to include such discussions.

4. Other Comments. There are a number of areas in the draft statement which could be made considerably more readable and understandable to the layman and scientist alike by adding the following additional sections to the statement:

a. Bibliography. The draft statement contains some conclusions which appear to be based on surveys or other statistical or research sources. For instance, on page 38, it is stated that "The future needs of the coal may be more urgent than our present needs for electricity." References to the sources for this and similar predictions would be very helpful to persons examining the statement.

b. Glossary. A glossary should be added defining such terms as "primary impact", "secondary impact", "pollution", and other similar words used throughout the draft statement. There are statutory definitions of these terms which appear to be different than the definitions which the drafters of the statement mean to attribute to the terms. For example, see the definition of "pollution" in the Montana Clean Air Act.

c. Appendix. An appendix describing the science of diffusion modeling would prove useful. Although the draft statement on page 12 states that diffusion modeling is "explained

more fully in the section dealing with sulfur dioxide", no such full explanation was found in that section. Readers of the statement deserve a full, descriptive explanation of diffusion modeling as it was applied to the analysis of the proposed project.

d. Maps. Illustrations, figures, maps, etc., offering a graphic statement for the laymen of Colstrip and its environs would be useful. The spatial relationship between this project and other features of the surrounding area would be enhanced through these visual aids.

Finally, we wish to point out that the applicants will be conducting continual monitoring studies of the air quality in the area both before and during the operation of the proposed project. These studies will be available to the Department of Health and Environmental sciences if it wishes to use them to supplement its own monitoring studies.

If you wish to review any of these comments with us, we would be pleased to meet with you. We hope that you will give these comments your fullest consideration and revise your environmental impact statement to incorporate them.

Very truly yours,

MONTANA POWER COMPANY

By Carl R. Anderson

PUGET SOUND POWER & LIGHT COMPANY

By W. J. Finnegan

Montana-Puget Combined  
Loads and Resources  
Megawatts

PEAK (Energy required at time of heaviest load)

	1972-3	1973-4	1974-5	1975-6	1976-7	1977-8	1978-9	1979-80	1980-1	1981-2
<u>Firm Load:</u>										
Montana	822	879	926	972	1020	1071	1125	1182	1241	1304
Puget	2022	2175	2341	2514	2719	2937	3177	3423	3716	4018
Total	<u>2844</u>	<u>3054</u>	<u>3267</u>	<u>3486</u>	<u>3739</u>	<u>4008</u>	<u>4302</u>	<u>4605</u>	<u>4957</u>	<u>5322</u>
<u>Net Resources:</u>										
Montana	941	874	940	877	774	774	774	767	811	811
Puget	2086	2151	2184	2430	2438	2465	2605	2542	2387	2373
Total	<u>3027</u>	<u>3025</u>	<u>3124</u>	<u>3307</u>	<u>3212</u>	<u>3239</u>	<u>3379</u>	<u>3309</u>	<u>3198</u>	<u>3184</u>
Net Surplus (Def)	183	(29)	(143)	(179)	(527)	(769)	(923)	(1296)	(1759)	(2138)
Colstrip #1 & #2				330	660	660	660	660	660	660
Less Added Reserve Obligation				-50	-99	-99	-99	-99	-99	-99
Surplus (Deficiency)	<u>183</u>	<u>(29)</u>	<u>(143)</u>	<u>-101</u>	<u>-34</u>	<u>(7208)</u>	<u>(362)</u>	<u>(7735)</u>	<u>(1198)</u>	<u>(1577)</u>
<u>ENERGY - (Critical period average)</u>										
<u>Firm Load:</u>										
Montana	567	598	629	661	693	726	760	798	837	878
Puget	1210	1270	1363	1464	1576	1701	1836	1980	2139	2315
Total	<u>1777</u>	<u>1868</u>	<u>1992</u>	<u>2125</u>	<u>2269</u>	<u>2427</u>	<u>2596</u>	<u>2778</u>	<u>2976</u>	<u>3193</u>
<u>Net Resources:</u>										
Montana	613	622	663	616	573	596	597	598	657	665
Puget	1210	1338	1280	1375	1315	1350	1399	1344	1282	1272
Total	<u>1823</u>	<u>1960</u>	<u>1943</u>	<u>1991</u>	<u>1888</u>	<u>1946</u>	<u>1996</u>	<u>1942</u>	<u>1939</u>	<u>1937</u>
Net Surplus (Def)	46	92	(49)	(134)	(381)	(481)	(600)	(836)	(1037)	(1256)
Colstrip #1 & #2				280	561	561	561	561	561	561
Surplus (Deficiency)	<u>46</u>	<u>92</u>	<u>(49)</u>	<u>146</u>	<u>180</u>	<u>80</u>	<u>(39)</u>	<u>(275)</u>	<u>(476)</u>	<u>(695)</u>

# *The* MONTANA POWER COMPANY

GENERAL OFFICES  
ELECTRIC BUILDING  
BUTTE, MONTANA 59701

February 12, 1973

Daniel Vichorek - Technical Writer  
State Department of Health  
Helena, Montana 59601

Dear Mr. Vichorek:

The following discussion is offered in reply to your inquiries in your letter of January 12.

January 12 Letter

1 - Why was the Colstrip site most feasible?

Site selection for this project lead to the Colstrip area for environmental and economic reasons.

Environmentally, the Colstrip area is remote and development would affect fewer people directly; i.e., fewer residences, less roads and highways with less use. The weather patterns of eastern Montana are generally less confining than the more mountainous terrain of much of the MPCo.'s service area (detailed investigation has proven the weather patterns at the specific site selected to be acceptable). Existing land use levels would be upgraded by the proposed development; i.e., more people would realize more use from the energy available from this land than the values being received by very few people at its present level of use. Also, the lands disturbed by the mining activity will be reclaimed, and the extensive research over the past 5 years in WECO.'s area, indicates the disturbed land will be back in production in 3 to 5 years. The site adjacent to the town of Colstrip minimizes the travel and time of the operating personnel to and from work, as town facilities, including homes, would be provided by expanding the existing village.

Economically, all locations away from the mine area were subject to uncertain future freight rates for transportation of coal by rail, and also to possible shutdown from transportation labor strife that could interrupt coal deliveries. Also for this project, much of the energy transportation is accomplished

Mr. Vichorek

by displacement over existing transmission lines. But even a new transmission line installation has the advantage of known and practically fixed costs associated with it with a one time set investment required. Contrast this known cost with the unknown future freight rates for moving the coal.

- 2 - What was unfeasible about the other sites and might they be developed in the future?

The other sites considered were not as desirable as the Colstrip site in one or more of the reasons listed in #1, and were not necessarily found to be unfeasible. Each of the fifteen other sites around the state were considered to some degree, but not necessarily in great depth. An obvious unique local condition may have discounted a location promptly without serious consideration.

- 3 - What was discovered about the soil permeability and the water table at Colstrip?

Drilling throughout the Colstrip area finds the soils to be recent alluvium underlain by interbedded shales and lenticular sandstones overlaying the coal seams. The shales have little or no permeability. The first water zone is found in the coal seal, but potable water supplies throughout the area are taken from below the McKay coal seam; e.g., the Colstrip town shallowest water wells are completed at a depth of 350 ft., whereas the McKay seam at the plant site was at a depth of about 20 ft.

- 4 - Will any well water be used for any phase of the proposed project?

The only use of well water for this project will be from a 600 ft. Ft. Union well for water at the concrete batch plant. The well was drilled specifically for that purpose. A 9330 ft. Red River well was drilled by the MPCo. to test the availability of water for this project from underground aquifers. Testing of the Red River and Mission Canyon zones indicated deliverability restrictions and chemical composition requiring substantial treatment in order to make it usable.

- 5 - How much well water is available?

The Red River and Mission Canyon aquifers are practically unlimited in that they are being recharged from outcrops in the Big Horn Mountains and the Black Hills. Productivity on the test well reached 390 gpm from the Mission Canyon and Red River combined.

Mr. Vichorek

- 6 - What possibility is there of materials from the ponds reaching the water table?

None. The settling ponds will be sealed with bentonite or some other impervious material to eliminate seepage into the ground. Methods and procedures to achieve suitable sealing are currently being investigated.

- 7 - What precautions will be taken against contamination of ground water?

No seepage into the ground or out of the pond in any direction, except for evaporation will be permitted as stated in #6.

- 8 - How tall will the cooling towers be?

The height furnished for your draft statement still applies; i.e., 65 ft. high x 48 ft. wide x 252 ft. long.

- 9 - What precautions were taken to prevent plume mixing between stacks and the cooling tower?

The low level cooling tower water vapor emission is about 600 ft. west of the stacks, which is generally upwind from the stacks.

The low level emissions of water vapor at a height of 65' with little thermal rise, will not mix with the stack emissions being released at 500 ft. with a significant thermal rise effect. In general, air movements will influence both emissions in the same direction which will tend to maintain the elevation difference. Appreciable lateral movement of the plumes will have to occur before mixing takes place, and such movement will dilute the concentrations of each plume. Mixing of plumes with sufficient concentrations of their individual components to have any detrimental effect will not occur.

- 10 - What is your estimate of monthly payrolls for each month at Colstrip project through the construction period?

See the attached schedule.

- 11 - Do you have any information on the drift potential from Colstrip on its (cooling water) ?

The cooling water will be fresh water, with some mineral carry over in the vapor, but these minerals will fall out within 200 ft. of the towers. Any fog formation is expected to be dissipated within the project property.

Mr. Vichorek

- 12 - Western Energy declined to cooperate in a study with the Fish and Game Department in 1969. Can you explain this?

WECO. was operating a limited mining activity in 1969 and had entered into a contract with the Endowment and Research Foundation at Montana State University to evaluate the flora and fauna in the area and research the reclamation needed for the mining area. As they had done with other mining companies, the Fish & Game Department approached WECO. suggesting a yearly fee of \$1,000 to do some sort of a study of the Colstrip area. MSU was investigating and evaluating everything that the Fish and Game could offer. Government agencies are developed specifically to investigate actions, past, present and future, in unique definite fields of endeavor. I find it difficult to understand that the Fish and Game Department could not investigate the activity just because WECO. did not contribute \$1,000/year.

MPCo. had not settled on the Colstrip site for the steam electric generating project in 1969. The choice was made in 1970. MPCo. was aware that a comprehensive study would have to be undertaken during the pre-project development to supply important base line data. Another agreement by MPCo. with the Endowment and Research Foundation at MSU extended their investigation and evaluation to cover a much greater area than just the mining reclamation agreement with WECO. A comprehensive wildlife study is also being pursued by a highly qualified local environmental consulting service. The necessary base line data will be established prior to the operation of these plants.

- 13- If studies indicate that the plant will be detrimental to the ecosphere, what will the applicant do to offset the effects?

Our extensive studies underway in the Colstrip area will establish what the ecosphere is. Continued observation will monitor changes in the base line conditions established by these studies. Changes identified as resulting from the project operation, will be investigated and evaluated.

Changes required to avoid detrimental effects from the project operation will certainly influence the project's future operation.

This project is being designed and developed to cause as little environmental impact as possible, but it will affect the environment. All actions do, including natural events. We will meet all of the requirements imposed by Federal and State laws and regulations for the operation of the project.

Mr. Vichorek

14 - Our booklet on how to conserve power was sent to you last week.

We continue to work on the balance of your questions. As soon as complete answers are developed, they will be sent to you.

Yours very truly,

*Carl R. Anderson*

Carl R. Anderson  
Manager, Environmental  
Protection Department

CRA/by

ESTIMATED MONTHLY PAYROLL AT COLSTRIP PROJECT  
UNITS #1 & #2  
(THOUSANDS OF DOLLARS)

	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>
Jan.	-	435	1241	2455	1926
Feb.	-	482	1300	2349	1455
Mar.	-	647	1338	2226	1220
Apr.	-	894	1494	2119	995
May	-	1029	1648	2036	807
June	-	1205	1864	1936	589
July	423	1341	2064	1899	622
Aug.	418	1405	2234	1852	463
Sept.	423	1400	2346	1864	416
Oct.	435	1305	2446	1929	410
Nov.	465	1247	2487	1993	410
Dec.	476	1229	2493	2011	410

based on:

Project 1972 costs - no escalation  
Includes payroll estimate for construction, operation,  
and mining labor.

# *The* MONTANA POWER COMPANY

GENERAL OFFICES  
ELECTRIC BUILDING  
BUTTE, MONTANA 59701

January 31, 1973

Mr. Daniel Vichorek  
Technical Writer  
State Department of Health  
Helena, MT 59601

Dear Mr. Vichorek:

I apologize for the delay in answering your letter of January 3, but your inquiries warranted complete answers and that has taken time. In reply, discussion of each of the questions you asked follows:

1. Has surveying begun on the two additional power lines?

No. Refer to my letter to Don Holtz dated December 29, 1972 included in your supplement to the Draft Environmental Impact Statement.

2. Has right-of-way for above lines been procured?

No.

3. When must survey be completed?

A July, 1973 completion of preliminary survey is necessary to allow sufficient time to evaluate environmental, engineering, right-of-way, and material considerations before construction which must commence in the spring of 1974.

4. About how far from Billings will substations be built?

Not yet located, but probably from 6 to 12 miles north in or adjacent to existing transmission line corridors.

5. How will substations be connected to the existing transmission facilities?

The substation will be the termination point of six lines. Two of those lines, one from Anaconda and one from the Billings Steam Plant, are presently in operation. An additional line from the Billings plant will be put on existing double circuit towers. Another of the lines will be the Billings-

Great Falls line that will commence construction in 1973. The proposed Colstrip lines will be the last two lines terminating in this substation.

6. How much and what size lines will be required to make the connection?

How much line is unknown until the exact substation location is set. The six lines referenced in No. 5 are all 230 kV size. With some of the lines already installed and operating, environmental considerations suggest location to be so as to require installation of the least amount of new line.

7. When must survey and right-of-way be completed for the pipeline?

By January 1, 1974, assuming everything else is ready, and construction starts that coming spring.

8. Sketch on map of possible pipeline and power line routes.  
Attached.

9. Detail flora and fauna along the routes, including how much crop land, range land and waste land?

Without precise routes, such detail would have to be so general and broad, the description would be impossible to ascertain with any precision, and would have little value.

10. How wide a right-of-way required for two parallel 230 kV lines?

Two hundred feet or less.

11. By two parallel 500 kV lines?

That size line is not part of this project, and The Montana Power Company has none of that size line on its system, but industry usage indicates up to 300 feet may be required.

12. What type of poles would be used for 230 kV lines?

Primarily two-pole X-braced wooden structures made with 50 to 60 foot poles. Some three-pole wooden structures required on angles.

13. For 500 kV lines?

Again, such lines are not part of the project and The Montana Power Company has none on its system, but industry uses metal structures primarily.

14. What are the specifications, route and projected completion date for the new Billings-Great Falls line?

The line will be a 230 kV routed from Billings via Judith Gap to Great Falls, and is scheduled for completion by November 1974.

15. Is this line related to the Colstrip project?

No.

16. What type and how many pumps will be required for each of the pipeline routes?

The design has not been finalized, and the pumps not selected. There will be a horsepower requirement of about 5000 horsepower and the pumps will probably be staged centrifugal.

17. Provide sketch of the development to illustrate the location of boilers, cooling towers and ponds?

The boiler and cooling tower locations were indicated on the maps submitted with our application for construction of equipment affecting air quality, in August, 1972. The 3-acre surge pond will be located about 1 mile north of the plant site, and the two settling ponds will be located approximately a thousand feet east southeast of the plant site, and will be approximately 30 acres in size. All ponds and equipment will be located on land presently owned by the Applicant.

18. What effort will be made to reclaim the land disturbed by the pipeline?

The normal reclamation procedure as pursued by The Montana Power Company in the past in the installation of its 1500 miles of buried gas transmission line will be applied to this installation. Backfill, compaction and proper re-seeding restores a pipeline right-of-way to its original appearance.

January 31, 1973

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Answers to the rest of the questions you've asked in this letter, as well as the two following letters of January 12 and January 24, are being developed and will be sent to you as soon as the necessary information can be gathered and the questions fully answered.

I am enclosing a copy of our power conservation booklet that you requested in your January 12 letter.

A copy of Puget Power's comparable publication is also enclosed.

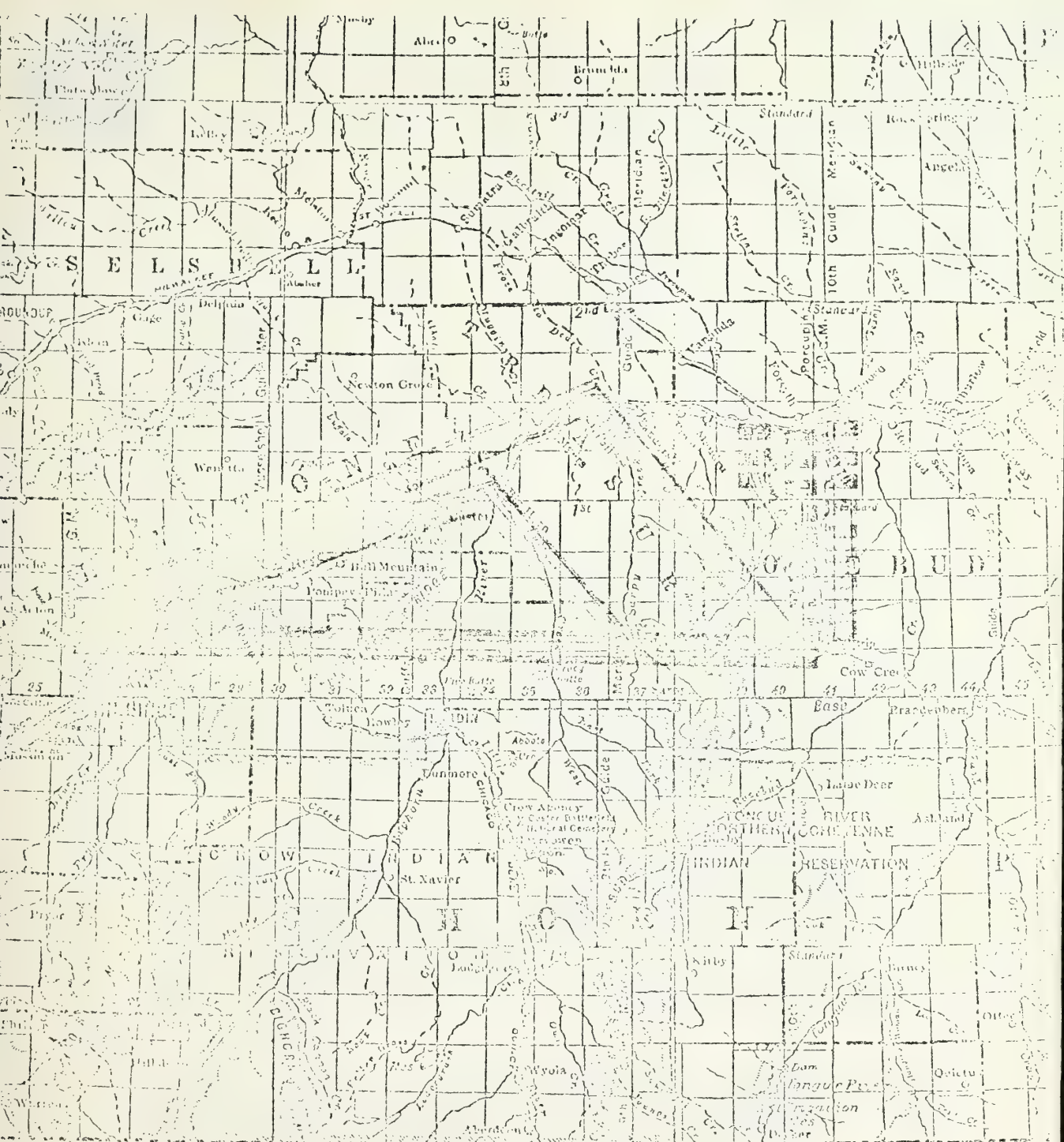
Yours very truly,



Carl R. Anderson  
Manager, Environmental  
Protection Department

CRA/by

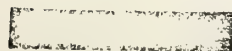
bcc: J. A. McElwain  
W. H. Coldiron  
R. A. Hofacker  
J. T. Evans  
R. J. Labrie  
W. J. Finnegan-PSP&L



### LEGEND



WATER LINES



230 KV ELECTRIC TRANSMISSION

### POSSIBLE CORRIDOR ROUTES

THE MONTANA POWER CO.  
BUTTE, MONTANA

DRAWN BY	G.T.	SCALE	NTS
CHECKED	T.S.	DATE	17 JAN 73
APPROVED		NO.	





# BOARD OF CRIME CONTROL

1336 HELENA AVENUE

HELENA, MONTANA 59601

TELEPHONE NO. 449-3604

February 16, 1973

IN REPLY REFER TO.

John S. Anderson, M.D.  
Director  
State of Montana  
State Department of Health &  
Environmental Science  
Helena, Montana 59601

Dear Sir:

In response to a letter from your Technical Writer, Mr. Daniel Vichorek, on the City of Colstrip, we are giving you the information we have in-house related to a subgrant where we funded manpower and equipment for Rosebud County. The City of Colstrip is in that County.

I am enclosing parts of the subgrant, giving you what data we have and information showing the budget page of what we are doing to assist them in trying to take care of any police impact in that area. It will also explain what they believe they can do from added taxes in the years to come after this funding year has ended.

The academic and professional background from the persons contributing information on this is from, what we believe, the expertise in that area, such as the District Judge Al Coate, the County Attorney, the Sheriff and the Juvenile Probation Officer. Since this grant was awarded, the City of Forsyth and the County of Rosebud have consolidated. I believe this will give them even better coverage from the additional manpower that we have funded to cover the impact of this Colstrip area.

Montana Power Company has asked assistance in law enforcement in Colstrip itself. As you know, this is not an incorporated city but a privately owned town. They are having problems with the local sheriff enforcing the law, as their director wants to limit what an officer can do inside the Colstrip area. We have tried to look at the entire county's problems in these matters. The other coal companies have given us what information they have of what they

JOHN S. ANDERSON, M.D.  
FEBRUARY 16, 1973  
PAGE -2-

believe their impact will be in the surrounding areas. The information I am sending you is the best that we have been able to come up with at this time. Some of the figures and data is from the State Planning Office here in Helena. Others come from the local law enforcement and criminal justice people.

I hope this will be of some help to you.

Sincerely,

BOARD OF CRIME CONTROL

  
Laurence L. Lytle  
Law Enforcement Advisor

LLL:sac

Enclosures

## COAL INDUSTRY DEVELOPMENT IMPACT AREA

The estimated population increase in Rosebud County due to renewed COAL activity is projected at 700 families or about 2,800 persons. This is a county of 6,032 population; 5,042 square miles; with 281.75 miles of improved roads; 1,391 of unimproved roads and a taxable valuation of \$10,559,000.00. It is a fifth class county with the city of Forsyth as county seat and a population of 1,873. Forsyth is a third class city. Within the county boundary is the Northern Cheyenne Indian Reservation, with the towns of Lame Deer, Birney, Ashland, Colstrip, Finch, Rosebud and Angela. These towns are prefected by the Sheriff and five officers. The city of Forsyth has a chief and three officers, three civilian dispatchers and two part-time dispatchers.

The COAL development is solely a private enterprise, and it is felt by local government that they can assume the added costs from a broader tax base provided by the coal industry. If funds are transferred from the ABM area to Rosebud County to assist for one year, local governments can then support the additional manpower to other needs within the Criminal Justice System.

It has been determined by Montana State officials that the COAL development sites will create a primary impact area which should receive planning priorities. A permanent industry will develop with an increasing and permanent population.

In requesting the transfer of funds from the ABM area, we have estimated a one year funding period from September 1, 1972 to August 31, 1973.

## PROJECT BUDGET

Category:

DESCRIPTION	FROM FEDERAL FUNDS	*FROM LOCAL FUNDS	FROM IN-KIND SERVICES	TOTAL PROJECT COSTS
<b>A. Personnel</b>				
Deputy Probation officer	8,000.00			8,000.00 ✓
Deputy Sheriff	5,931.00			5,931.00 ✓
Secretary	4,800.00			4,800.00 ✓
District Judge (Proj. Dir. 10%)			2,200.00	2,200.00
Chief Probation officer (20%)			2,040.00	2,040.00
Sheriff (20%)			1,400.00	1,400.00
Employee Benefits	2,224.04			2,224.04 ✓
<b>TOTAL PERSONNEL</b>	<b>20,955.04</b>		<b>5,640.00</b>	<b>26,595.04</b>
<b>B. Consultant Services</b>				
<b>TOTAL CONSULTANT SERVICES</b>				
<b>C. Travel</b>				
20,000 miles Probation off.	2,400.00			2,400.00 ✓
Expenses-Maintenance Sheriff car		2,400.00		2,400.00 ✓
<b>TOTAL TRAVEL</b>	<b>2,400.00</b>	<b>2,400.00</b>		<b>4,800.00</b>
<b>D. Equipment</b>				
Patrol Car	2,925.00	975.00		3,900.00 ✓
2 Mobile radios 4 freq+installation	1,210.00	400.00		1,610.00 ✓
Graphic Camera Kit	525.00	175.00		700.00 ✓
Typewriter	220.00	75.00		295.00 ✓
Psychological testing kit	275.65	92.00		368.65 ✓
2 Monitoring cameras	375.00	125.00		500.00 ✓
2 Video Monitors	743.50	247.50		990.00 ✓
<b>TOTAL EQUIPMENT</b>	<b>6,274.15</b>	<b>2,039.50</b>		<b>8,313.65</b>
<b>E. Operating Expenses</b>				
Installation of Monitoring equip.				
including wire	800.00	200.00		800.00 ✓
Long-line charge Mountain Bell Tel.	15.00	5.00		20.00 ✓
<b>TOTAL OPERATING EXPENSE</b>	<b>615.00</b>	<b>205.00</b>		<b>820.00</b>
<b>TOTAL PROJECT COSTS</b>	<b>30,244.19</b>	<b>4694.50</b>	<b>5640.00</b>	<b>110,578.69</b>

\*Please indicate if from other than local sources

This section constitutes the heart of the grant application. It is the applicant's detailed statement of the project -- its aims, precisely what will be done, who will be involved and what results can be expected. Together with the project budget, it provides primary evidence for LEAA and the Governor's Crime Control Commission of the soundness of the project, the care and planning that has gone into its formulation, and the responsibility and qualifications of the applicant and others who will be involved.

#### SPECIAL REQUIREMENTS

Request for EQUIPMENT must include the following information:

Full description of present inventory  
Is equipment an addition to or a replacement of present resources?  
Full description of equipment requested, including make and model.

Request for TRAINING ASSISTANCE must include the following information:

Training background of applicants involved.  
Full description of school, including agenda, course out-line, curriculum and instructors. Attach official brochure whenever possible.

THIS NARRATIVE SHOULD FULLY EXPLAIN ANY ITEM NOT COVERED FULLY ON BUDGET PAGE.  
Use Continuation pages if necessary

The Following program is designed to alleviate the pressure on law enforcement in the 16h Judicial district caused by the sudden influx of people into Rosebud County.

#### Personell:

Deputy probation officer to hired from federal funds.  
Deputy Sheriff to be hired from federal funds.  
Secretary to be funded from federal funds, services to be shared jointly by Probation office and the County Attorney's office.  
Judge Alfred Coate will act as the Project Director and will devote 10% of his time supervising the project.  
Irvin Zeitner, Chief Probation officer will devote 20% of his time supervising and training the new probation officer.  
Sheriff Andy Schulenberg will spend 20% of his time in the supervision and training of the newly hired deputy sheriff.

#### Travel:

20,000 miles per year to be traveled by the deputy probation officer needed from federal funds. Computed at 12c per mile.  
Rosebud county will maintain and support the new or additional patrol car to be purchased. Computed at \$200.00 per month.

---

#### APPLICATION DISTRIBUTION:

##### For Units of Local Government

White copy - applicant agency  
Green copy - Region Council  
Gold copy - Region Council  
(to be forwarded to Crime Commission)

##### For State Agencies

White copy - applicant agency  
Green copy - extra  
Gold copy - Governor's Crime  
Control Commission

Equipment:

Patrol Car, needed for additional deputy to be hired that will be stationed at Colestrip, Mt.

Two Mobile Radios 4 frequencies, Model MT74TFN 100 Watt including installation. One to be installed in the additional patrol car and one to be installed in the deputy probation officer's car.

Graphic Camera Kit, needed equipment by the Sheriff's office.

Psychological Testing kit, usefull instrument needed by the Juvenile Probation office.

Two WV-033v CCTV/VTR Monitoring cameras.

Two WV-7063P Video Monitors, this equipment to be used to be able to monitor the jail at all times. The jail is used jointly by the Sheriff and the City Police.

Operating expenses:

Installation of monitoring equipment and including the necessary wire.

Line rental charges to Mountain Bell Telephone Co.

# *The* MONTANA POWER COMPANY

1-12-73

ENVIRONMENTAL SCIENCES  
DIVISION

GENERAL OFFICES  
ELECTRIC BUILDING  
BUTTE, MONTANA 59701

January 12, 1973

Air Quality Bureau  
Montana State Department of Health  
and Environmental Sciences  
Cogswell Building  
Helena, MT 59601

ATTENTION: Mr. Don Holtz

Gentlemen:

We understand you do not have copies of Stearn's "Air Pollution" which we referred to in our statement at the public hearing in Miles City on January 5, 1973.

Enclosed are copies of Pages 535 to 549 from the Second Edition of Volume III of that text. Although this chapter discusses the water quality aspects of air pollution control, the references to the use of wet scrubbing systems for fluoride control, especially Pages 540 and 541, make it clear that this equipment can be expected to minimize residual fluoride emissions from our proposed operation.

Also enclosed is a copy of Part 1 of Chapter 5 from Volume I of the same text. We referred to this in our discussion of radioactive emissions.

Finally, we are enclosing copies of a chapter entitled "Environmental Radiation From Pressurized Water Reactors" from "The Environment and Nuclear Power" by Dr. James H. Wright, Director, Westinghouse Environmental Systems Department. Pages 14 and 15 give information on naturally occurring radiation which we believe helps to put any expected radiation effects from our Colstrip plants into proper perspective.

Very truly yours,

*Daniel T. Berube*  
D. T. Berube  
Thermal Generation Engineer

DTB/mje  
Enclosures





DOLORES COLBURG

February 22, 1973

RECEIVED  
FEB 22 1973  
ENVIRONMENTAL SCIENCES  
DIVISION

Mr. Daniel Vichorek  
Technical Writer  
State Department of Health  
and Environmental Sciences  
Helena, Montana 59601

Dear Mr. Vichorek:

I have your letter of February 6 concerning the projected population increase in the Colstrip area, and I am pleased to offer pertinent information.

We have been in touch with the schools in the Colstrip area and our supervisors have discussed with school personnel the building and curricular expansion for their elementary and secondary schools.

We have made our School-Community Assistance Process available to school officials, and we are prepared to offer professional assistance in every way possible. A description of the process is attached for your information. The School-Community Assistance Process is under the direction of Dr. L. E. Scarr, Assistant Superintendent in my office.

If I can be of further assistance, please let me know.

Sincerely,

A handwritten signature in cursive script that reads "Dolores Colburg".

DOLORES COLBURG  
State Superintendent

DC:el  
Encls.



# The MONTANA POWER COMPANY

RECEIVED

FEB 2 1973  
ENVIRONMENTAL SCIENCES  
DIVISION

GENERAL OFFICES  
ELECTRIC BUILDING  
BUTTE, MONTANA 59701

February 20, 1973

Daniel Vichorek, Technical Writer  
Dept. of Health  
Helena, MT 59601

Dear Mr. Vichorek:

Once again I apologize for the delay in answering the rest of your inquiries of January 3rd and 24th. The following discussion is offered in reply to the balance of your questions.

## January 3 Letter

### 19. Why is the power plant needed?

This Colstrip Project is needed to supply the electrical energy required by the customers of M.P. Co. and PSP&L Co., and other citizens of the Pacific Northwest. That customer requirement is based on the projection of past usage adjusted for known changes. The historical peak and energy loads for the M.P. Co. are attached, as well as the projected loads, resources and deficiencies for M.P. Co. and PSP&L through 1982. The projection, which was previously presented to your department with our comments on your Draft EIS, shows the increasing requirements and deficiency and the need for additional electrical energy.

The M.P. Co. generation, together with purchased power, served the 1971-72 winter peak load with 124,000 kW to spare. But 144,000 kW of power purchased in 1971-72 will not be available to M.P. Co. by the winter of 1975-76 because the electric suppliers now selling us this power will need it for their own customers. An additional 27,000 kW of purchased power will be lost to M.P. Co. by the winter of 1976-77.

The M.P. Co. load historically grows at approximately 5% per year. We see nothing which will substantially change this. If the Colstrip units are not constructed, M.P. Co. will be 174,000 kW deficient by the winter of 1975-76. M.P. Co. will be deficient by 246,000 kW by the winter of 1976-77.

February 20, 1973

Page 2....

The increasing requirement for electrical energy is the result of our expanding productivity which has made us the greatest industrialized nation in the history of mankind. The use of electrical energy has also increased our life expectancy, decreased our work week, and allowed us to develop the casual pleasures of our life style, such as TV, radio and light to increase our productive hours and expand our horizons. Energy protects us from the elements and adds to our security. Electrical energy is truly a necessity in our modern lives.

There is no alternative to the Colstrip Project. No other technically proven source of electrical energy is possibly achievable in time to supply the electrical needs of the M.P. Co. customers. The only technically proven alternate energy source available in the size of this project is nuclear fission. That source would not only be much more expensive, but could not be constructed by 1975. Eight to ten years are required for such a nuclear project, and there would still be much environmental concern by the public.

Other sources of energy are alluded to by uninformed persons, but such alternatives are not available. Such sources mentioned are wind, solar, organic waste, geothermal and MHD.

Wind power has been used for pumping water wells and charging batteries throughout the world for years. These are sporadic uses and adaptable to the caprice of nature. 700 MW of reliable sustained electrical energy could not be developed with such a system.

Solar energy sites are limited to 35° north and south of the equator. Stronger and more continuous sunshine is available in that area. Even there, with continuous sunshine for reliability (which of course, is not available) a 700 MW output would require about a 70 square kilometer collecting area with a collecting efficiency of 10%. (See Scientific American Vol. 224 No. 3 Sept., 1971, p.67) Montana is not geographically located to even consider such an installation.

Decomposition of organic waste holds interesting, but limited possibilities for future power generation. The city of Missoula is an example of the current technology of such a process. That metropolitan area utilizes the methane generated in their sewage treatment facility, and realize only enough gas to partially power a 187 kW electric generator. Their average electric load in 1972 was about 1800 kW per day, ten times the usable methane realized from their waste processing.

Geothermal is also of limited applications. Such development is confined to unique geological locations where the earth's heat is near the surface, such as the Geysers in California. That prime geothermal project supplies only 302 MW of electric capacity, less than

one half of the proposed Colstrip Project, and it has been under development since 1956 when the well drilling began in earnest.

The sources listed above are just being investigated or developed, but have hardly progressed beyond the laboratory pilot plant stage. Even MHD (Magnetohydrodynamics) utilizing clean burning natural gas in Russia, which is a rapidly diminishing energy source in most parts of the world, has not been developed beyond 25 MW of capacity.

Coal is the most realistic energy source available for conversion to electrical energy at the present time with known technology. Other fossil fuels are in short supply whereas coal is an abundant resource. Nuclear fissionable material is also limited in supply at the present time, although that will be resolved when the FBR is developed. Developable hydro sites are limited, and such projects have limited public acceptance.

The proposed Colstrip Project is truly the only technically proven and possibly achievable source of electrical power required to supply the increasing demand for electrical energy by the customers of M.P. Co. and PSP&L .

20. Is the demand for power growing faster than the population of Montana?

Yes. For example, the residential customers of The Montana Power Company increased from 131,203 in 1961 to 151,334 in 1971, about a 15% increase. Whereas the individual residential customer average usage increased from 4,177 kilowatt hours per year to 6,032 kilowatt hours per year in the same period of time, about a 44% increase.

21. What accounts for this increase?

One of the classes of customers whose use of electricity has increased the most has been the farmer. Farms now use as much electricity as many small industrial concerns. Television has been one of the larger contributors to the use of electricity. Lights of all kind contribute less to the growth of electric demand than many other appliances, such as ranges and water heaters.

The previously referenced residential increase has been lightening the physical work for the homemaker and increasing leisure time, brightening evenings for more reading and other pleasures, as well as enhancing law enforcement, increasing safety on the streets and highways. But the residential use amounted to only about 20% of the total sales of The Montana Power Company in 1971. The balance of the electrical sales provided jobs, goods, services and conveniences in our commercial and industrial world. Some of that use was for environmental improvement, and more will be required for that use in the future as additional towns install the sewage treatment equipment required by

February 20, 1973  
Page 4....

recent federal law, as proper disposal or recycling of the ever increasing amounts of solid waste is developed and as more emission sources are controlled to improve air quality. With reference to that, about 30,000 to 40,000 kW of the capacity of the Colstrip generation will be consumed at the plant just to operate the air quality control equipment being installed.

22. Use of power by percentage in Montana to industry, home heating, aluminum smelting and all other uses?

The state totals are not readily available, but those figures for The Montana Power Company system in 1971 were:

Industrial - 2,178,169 Mwh  
Home Heating - insignificant \*  
Aluminum Smelting - 0  
All other uses - 2,392,116 Mwh

- \* Only 1,483 dwelling units are equipped with electric heat on The Montana Power Company system, and many of them are seasonal dwellings, such as summer cabins or ski resorts. The overall electric consumption for home heating is very small since natural gas has more than a 95% home heating saturation in the company service area. Other fuels for home heating include oil, coal, propane, wood and hog fuel.

23. Power exported out of state will be delivered where, and will be used for what?

The Montana Power Company system is an integral part of the Northwest Power Pool and the Western Systems Coordinating Council as described by Mr. John Ellis of Puget Sound Power & Light Company in his presentation to the board at the public hearing in Miles City on January 5. We presently have 230 kV ties south to the Bureau of Reclamation and Pacific Power & Light at Yellowtail Dam, southwest near Lima to Utah Power and Light and Idaho Power Company, and west to Bonneville Power Administration and Washington Water Power Company at Anaconda and Hot Springs.

The power produced at Colstrip Units #1 & #2 largely will be consumed in Montana. Exported power will flow through The Montana Power Company system to any one or all of the interconnected systems at various times with Montana Power Company and Puget Sound Power and Light Company owning and controlling the output of this project equally for each unit. The power will be used to satisfy the customer requirements of those interconnected utility systems, and will be a necessary part of total supply required to maintain the integrity and reliability we all expect and demand of our electric service.

24. What accounts for the increased demand for electricity in the area where the power will be delivered?

Generally the same things that increase the demand in Montana as described in answers 19, 20, & 21, but compounded by greater population increases in many areas in the Pacific Northwest than the increase experienced in Montana. People migrate to and are productive in the places where the most opportunity and the greatest number of jobs are available. Montana's limited growth indicates a lack in those.

25. What are the economies of hauling coal to the generating plants near the out of state load centers vs power transmission from mine-mouth generating plants?

The economies are unique with individual company situations as shown by the fact that coal continues to be shipped to load centers even for new plants being built in the Midwest by some companies. And others, namely Puget Sound Power & Light Company and Montana Power Company, are investing in mine-mouth generation.

The power produced at Colstrip Units #1 & #2 largely will be consumed in Montana. System Montana flow studies indicate that the only transmission necessary for the project under application would be lines wholly within Montana. The project will not require new transmission westward outside the State.

From a regional reliability standpoint, construction of the generating plant and transmission lines in Montana will significantly improve the load flows within the coordinated network of the Western Systems Coordinating Council, strengthening this traditionally weak portion of the system. With the generating plant at Colstrip, load flows eastward into the State will be reduced and at certain times reversed.

Bonneville Power Administration (BPA), the Washington Water Power Company (Water Power) and Montana Power Company have interconnections in western Montana. Puget Power has interconnections with BPA and Washington Power in western Washington, thus Puget Power's share of the project output will be furnished to Puget by displacement through the company's interconnections with BPA and Washington Water Power. In other words, Puget Power's share will be consumed by customers of BPA and Water Power in the eastern portion of the Northwest Power Pool while an equivalent amount of power will be supplied to Puget Power in western Washington. This procedure eliminates the need for interstate transmission line construction and reduces the line losses of the involved utilities.

With the only transmission required located in Montana, clearly the evidence overwhelmingly favors transmission as the alternative to hauling the coal in this instance. The economics of these

February 20, 1973  
Page 6....

alternatives as applied to other generating plants would, of course, vary with the capacities, plant locations and load locations involved.

Also, definite advantages do exist with an electric transmission line investment, compared to shipping coal. The energy transportation over the electric transmission line would not be exposed to future escalation of freight rates, and the possibility of interruption of energy delivery caused by transportation labor disputes would be eliminated.

January 24 Letter

1. Have you definitely decided on venturis?

Yes.

2. What leads you to believe the venturis will perform up to par over the life of the plant?

The EPA set their recently adopted "stationary new source emission" standards on the fact that scrubber technology was proven, as Dan Berube pointed out in his statement in Miles City.

Also, Bechtel Corporation, the engineering contractor on the Colstrip Project, of world-wide reputation, organized a research team for the investigation of scrubber technology. They concluded venturi scrubbers are feasible and in fact developed, and recommended they be used on this Project. In addition, the M.P. Co. engineering staff investigated this problem in depth and visited numerous scrubber installations throughout the country. Their findings and observations confirmed Bechtel's results and further recommended the use of venturi scrubbers. The expenditure of \$20 - \$25 million is never done lightly. Every check and evaluation achievable has been pursued prior to committing that amount of money for this equipment.

I would also like to point out that the plant operation is entirely dependent on suitable scrubber performance. The plant cannot be operated without the scrubbers in service, as there will be no by-pass installed. If the scrubbers plug off, the combustion gases cannot be exhausted.

3. Other reports on the operation of venturis on other plants similar to the Colstrip development?

Attached is a review of "the State of the Art" of scrubbing, summarizing the development of scrubbing. We have reviewed many technical reports on other installations, as you no doubt have. We are currently investigating operating performance of this unique venturi application with a pilot installation on the J. E. Corette unit at the Billings Plant for which we have received authorization. Design parameters and performance characteristics developed from the operation of this pilot installation will be the basis for building the Colstrip facilities.

4. Have you checked into the Krebs-Elbair type scrubbing device?

Yes. It was our decision that if particulate only had to be removed, such equipment could possibly have been used. A limited amount of  $\text{SO}_2$  would also be removed, but the capacity and flexibility of this device is much more limited than the more sophisticated venturi selected. The Krebs could possibly remove up to about 20% of the  $\text{SO}_2$  with the Colstrip ash characteristics. The venturi, equipped with delay tanks and utilizing the ash for scrubber liquor, will result in higher  $\text{SO}_2$  absorption rates up to 40%. A review of this scrubbing technique is being developed and will be sent to you when done, probably this week.

5. Are the concentrations of sulfur, fluoride and other pollutants uniform throughout the coal seam?

The analysis of various coal samples from the Colstrip seam show minor variations in the sulfur and fluoride content. The coal has also been tested for mercury. Test results have already been submitted to the Department of Health. The majority of the sulfur occurs as pyrite nodules, deposited in fractures in the coal and as fossil replacement. Incidentally, the larger pyrite nodules are rejected by coal pulverizers in the Corette plant, and the Colstrip plants will be equipped with similar pulverizers.

6. Which trace elements will be looked for in the West Associates analysis?

The elements being investigated are arsenic, boron, beryllium, cadmium, chromium, fluoride, germanium, mercury, manganese, nickel, lead, selenium, vanadium, yttrium. The study is not yet completed.

M.P. Co. has now entered into an agreement with the Endowment and Research Foundation at MSU to investigate the same 14 elements in Colstrip coal. This program is just starting. Some core hole coal samples have been collected. Additional sampling will establish a proper pattern for full evaluation of the coal deposit, both laterally and vertically. This information, in conjunction with West's information on disposition during combustion, will lead to positive identification of emissions.

7. When will the results be available?

West Associates have some data that is being evaluated, but is not available until the project is completed, which should be during the last half of 1973.

The MSU investigation is just starting. Assuming no delay in establishing techniques and procedures, data should start becoming available by mid-year.

February 20, 1973

Page 8....

8. What other facilities will be built for the construction workers?

A construction camp is being erected by M.P. Co. for construction workers. The camp design has been reviewed and approved by the State Department of Health, Environmental Services Bureau. The camp will be equipped with a kitchen-dining facility that will handle 300 people, and which can be expanded up to a capacity of 500 people. There is also a recreation hall included in this camp.

A 20 unit camper area, including a central washroom with showers, toilets and laundry facilities is also being developed.

Also, M.P. Co. is developing a 200 unit mobile home park for construction workers. The town of Colstrip is also being expanded by Western Energy Company. Additional homes are being built, and the mobile home park is being expanded. The town development is described in detail in the enclosed brochure summarizing the Ken R. White planning group's recommendation. The town sewage facility was recently expanded by a local special improvement district to accommodate all of the present and planned development. An approved landfill solid waste disposal area is also available.

9. What slimicides would be used in the towers at Colstrip?

The precise slimicides have not been selected, as the potential problem has not been evaluated at this time. Any chemical treatment required will certainly be accomplished with acceptable and approved chemicals or slimicides.

10. How will slimicide bearing water be treated?

We do not know at this time. Treatment will depend on the amount and type of slimicide required.

11. How will the water soluble portions of the ash be prevented from reaching the ground water?

Answered previously in question #6 of your January 12 letter.

12. What is the current status of construction at the plant site?

No activity has been underway since last December, when the balance of the concrete footings and foundations was poured for Unit #1. Steel is expected to start arriving early this spring.

13. When will the full year's meteorological report be available?

The total year summary is expected within a month and will be sent to you as soon as it is received.

February 20, 1973

Page 9....

Answers in previous letters cover the balance of your questions asked in the last paragraph of your letter of January 24. If additional information is required, please let me know.

I believe this completes the information required in your three letters with the exception of detailed design and operating specifications of the plant requested in your January 24 letter. As discussed with you, this information will be developed directly with Don Holtz by our engineering department.

Yours very truly,

A handwritten signature in cursive script, reading "Carl R. Anderson".

Carl R. Anderson  
Manager, Environmental  
Protection Department

CRA/by  
Enclosures



# ENVIRONMENTAL POLICY CENTER

324 C Street, S.E., Washington, D.C. 20003  
(202) 547-6500

RECEIVED  
JUL 1 1972  
ENVIRONMENTAL SCIENCES  
DIVISION

## COMMENTS OF:

THE ENVIRONMENTAL POLICY CENTER

ON

THE DRAFT ENVIRONMENTAL STATEMENT  
ON THE PROPOSED MONTANA POWER COMPANY  
PLANT AT COLSTRIP, MONTANA

Submitted by:

Bruce C. Driver



The Environmental Policy Center believes that the Draft Environmental Impact Statement (hereafter known as the Draft) does not adequately measure the environmental impacts stemming from the construction and operation of a 700 mw electrical generating plant at Colstrip, Montana. We recommend that another draft statement be circulated for public comment prior to the preparation of a final statement.

On page one of the Draft it is said that mine mouth plants are favored, "at least from the owner's standpoint." What about the standpoints of the citizens of Montana whose value preferences, as mirrored in the policy statements of section 3 of the Montana Environmental Policy Act (Montana Statutes 69-6503), are those which the state government is charged with implementing in its actions? In the Northern Plains there is very great risk that decisions made by private enterprise in a climate of indirect governmental subsidy and articulated in dollars and cents figures will be allowed to be determinative of the Region's future. The very real but intangible preferences of the people of the Region may be given short shrift. Nowhere in the Draft is there any example that the State has attempted to measure citizen feelings about the precedent-setting Colstrip Plant and related development. It may be that much useful information is being elicited by the comments to the Draft and attendant public hearings. However, in light of the complexity of the suggestions of the North Central Power Study, Wyoming-Montana Aqueduct Study and the Colstrip Plant's relationship to the concepts of these two studies, it is recommended that the State allow more time to pass before a decision be made on the question of permitting construction of the Plant. During this time citizen preferences ought to be more rigorously examined, the results of such examination appearing in a second draft statement to be circulated before preparation of a final statement. The extra time will allow citizens to more fully acquaint themselves with the meaning of the decision regarding Colstrip.

Also on page one, the Draft mentions Venturi Scrubbers, stating that, "There is evidence that the venturis will also remove most fluorides and trace metal compounds." In conjunction with the material on pp. 18-20 of the Draft pertaining to trace elements in the coal, this halting statement leaves us with no confidence that the State is aware of the problems which

can result from the buildup of trace elements in the environment or, if it is aware, that it is in a position to control these problems. In light of the spotty history of operation of venturis, we recommend that the State complete further research into the effectiveness of venturis in controlling trace elements which could arise from the coal seams to be mined in order to supply the Colstrip Plant with fuel.

The Draft makes only passing reference to the end use of the power to be generated at Colstrip. That much of the electricity will be consumed in load centers outside the boundaries of Montana should be of concern to those citizens of Montana who have a stake in the continuing availability of those aesthetic amenities, the lack of which in centers such as those to which the electricity from Colstrip may be sent, attracted them or their forefathers to Montana. That we live in a federal system in which much commerce is interstate will not mitigate the sting in the minds of many Montanans if most of the benefits from power development in Montana flow to private owners of capital and consumers outside the boundaries of the state, whereas most of the costs are imposed on Montana. At the very least the State ought to provide a more detailed picture of end-use of Montana resources in the "Description of Proposed Action."

We would like to see greatly expanded treatment of the pipeline transporting water to the Plant from the Yellowstone. This most cursory explanation does not let the public know what the size of the pipeline is to be or what the effects on the Yellowstone are of the withdrawal of the given amount of water, to name but two of the deficiencies which must be remedied.

In failing to discuss the strip-mining for coal and attendant problems of land reclamation necessitated by the Colstrip Plant, the State has made a serious mistake. If the Plant is permitted to be constructed, coal will be strip-mined, regardless of the fact that a later environmental impact study

on strip-mining may indicate that satisfactory land reclamation is unlikely. Construction of the Plant is the crucial event foreclosing honest consideration of future environmental impacts because of the pressure which will be exerted to allow coal to be strip-mined to fuel a plant which has already been certified and constructed. A revised draft must contain information on land reclamation technology and its physical ability to bring about satisfactory reclamation in the Colstrip area. Furthermore, the economics of reclamation and the institutional enforcement mechanisms of the State should be examined.

Section 5, Construction and Location, on page 3 of the Draft demonstrates that the State has little knowledge of or control over populations fluxes associated with construction of the Plant and thereafter. Where will the 800-900 men required for construction and their families live? Who will provide services for them? And what will happen to these services after these men and their families depart? The State must answer these questions before it makes a decision on the Plant. If it cannot answer them or if it allows private actions to determine the answers on an ad hoc basis, Montanans can be sure that they are on the road to seeing their state Appalachianized.

Page 8 of the Draft raises several points which are not effectively treated in the Draft. Under D., "Historical Values", the statements are made that "The archaeology of this area is not well known. This portion of Montana may contain a great wealth of historically significant archaeological material." The logical conclusion of this is to conduct a reconnaissance of the area believed to be affected by the Colstrip Plant and the supplying coal mines before permitting the construction of the Plant.

Regarding E, "Recreation", the importance of the Colstrip area and surrounding country to the national public should be stressed. Although not spectacular country like that found in the national parks and wilderness areas of Western Montana, Southeastern Montana is the epitome of the great rolling plains and, as such, occupies an important niche in American cultural history.

To the urban easterner, the Indian and ranching cultures which have developed on these plains have values of their own, apart from any aesthetic amenities offered by the wilder areas of Western Montana. Further examination should be made of the national demand for the recreational amenities offered by the Colstrip and surrounding areas before even part of the area is committed for power development.

The section on Meteorology leaves something to be desired in our opinion. The major east-west storm track across the United States does not pass through the center of the state. No major storm track crosses any part of Montana or, for that matter, anywhere near the state. Low pressure systems from the Pacific Northwest generally follow a trajectory which takes them southeast from Washington or Oregon across Utah into Colorado, New Mexico and, sometimes, Wyoming before they turn on a more easterly path. Storms not originating in the Northwest may form anywhere along an arc from Colorado through Texas, the Gulf and up the East Coast, but only rarely will a major storm originate in Montana. This is why precipitation levels are low and why no satisfactory, economically feasible technology of land reclamation for arid Northern Plains lands has been developed.

On page 12 of the Draft, it is said that "Emissions are expected to drift to the east." It is probably true that winds in the Colstrip area blow from west to east more than in any other direction. However, strong and prolonged northerly and northeasterly winds associated with arctic air masses may interrupt the west to east pattern for a substantial portion of the fall and winter months. And in the spring and summer, a southerly air flow may predominate for lengthy periods of time. We suggest that the State should have a better grasp of wind conditions and their variability before allowing construction of the Colstrip Plant.



Regarding "Impacts Other Than Emissions" there is a disturbing reliance on future willingness of Montana Power Company to do what is necessary to avoid damage to the environment. For example, on page 25 of the Draft, "The applicant has indicated that they will selectively landfill the ash if groundwater purity is threatened." Later, "Aeration equipment can be easily added...if an odor problem arises...." Will the state require it? The history of voluntary compliance in the utility industry is not such as to permit us to have confidence that action will be taken when necessary. The State must be able to assure its citizens that it has the power to assure that proper steps will be taken well after the construction of the plant is completed and when power is being produced. Who will monitor the Plant on a continuing basis? What are the sanctions which can be imposed if there are violations of state and federal law and regulations? It may appear that the answers to these questions are not the subject of an environmental impact statement. However, such information is vital and, indirectly, has an impact on the natural environment. Maybe this is why federal NEPA statements now carry extensive information about monitoring, lease forms, stipulations, etc.

On page 26 there is no indication that the State knows what the effect of alternative modes of sewage treatment are. If the state did know, it might have decided that a decision should not be made only on the basis of "simplicity of operation and costs" but ~~also on health and welfare~~ criteria.

We have the feeling when reading the section on "Impact on the Human Environment" that the State does not understand the nature or the magnitude of the problems involved. Planning may offset some of the more grotesque dislocations which mining can produce in a region. But no amount of planning can stop long term deterioration of a region when the capital responsible for

the boom departs, unless there are guarantees that the mining industry or the state pay the costs of relocation and maintenance of public facilities. These costs are likely to be staggering. An eroded tax base in the mining region will not help the State raise the money. Diminished agricultural viability of the land which is as well unable to sustain a tourist trade are but two of the ways in which the wealth of a region is diminished by mining. The source of future revenues to be used to mitigate the deleterious impact on the human environment must be the Montana Power Company and other private investors. Financial guarantees should be exacted before construction of the Colstrip Plant is permitted.

In Alternatives to the Proposed Action, the State is faced with discussing alternative means of supplying power to regions most of which are outside of Montana. The discussion on pp. 34-36 of the Draft talks in very general terms and in extremely cursory fashion about alternative energy sources. We submit that the discussion bears no relevance whatsoever to the question at hand. We realize that it may be irregular for one state to talk about alternatives for load centers outside its boundaries, but due to the nature of Montana Power Company's plans for the Colstrip facility, it is this question which should have been discussed.

In addition to erroneously framing the issue for discussion, the State has come forth with a most superficial analysis of alternatives. What would be the actual effect of not constructing the Colstrip Plant? Exactly who, if anyone, may suffer from the failure of this plant to produce electric power at certain times in the future? How many megawatts would have to be produced at some other power plant? How can we know what the parameters of an alternatives discussion are if we do not have some numbers to go on? A revised draft of the environmental statement must answer these questions.

Solar energy is more than in the research stage at this time. In fact the equipment necessary to collect and store energy from the sun for heating, air conditioning and ventilation in residences is in the nature of plumbing, not space age technology. Insofar as the electric power generated at Colstrip may be for these residential purposes, solar power would be a feasible substitute for Colstrip power were it not for the fact that much of this power appears to be headed for the cloudy Pacific Northwest, one of the few areas of the United States where solar power for residences may not be viable at this time.

Geothermal resources present much less of an "unknown" at this time than does satisfactory land reclamation technology in the Northern Plains. One study, "Geothermal Energy", prepared by Walter Hickel and staff for the National Science Foundation presents the following table entitled "Geothermal Energy Resources Potential":

	<u>1975</u>	<u>1985</u>	<u>2000</u>
<u>Power</u> (thousands of mws)	0.75	132	395
<u>Electrical Energy*</u> (millions of mwh)	5.913	1041	3114
<u>Oil Equivalent**</u> (millions of Bbls/day)	0.024	4.213	12.60

\*90% load factor

\*\*3,412 BTU/KWH and 5,800,000 Bbl of oil used at  
40% conversion efficiency

These are estimates made by a Panel on Geothermal Energy Resources, U.S. Dept. of the Interior, August 1972. They represent the amount of electric power possible from geothermal sources at certain times in the future. Data from this report indicate that geothermal power could be considered as an alternative source of power for the Pacific Northwest.

Missing from the section on Alternatives is consideration of the alternative of conservation of energy. A new draft environmental statement might point out, with reference to the Office of Emergency Preparedness's study, "The Potential for Energy Conservation," October, 1972, that there are substantial savings available in industrial, residential and transportation sectors of our energy-using economy from conservation measures. The OEP study suggests energy conservation measures can reduce nationwide energy demand by as much as the equivalent of 7.3 million barrels per day of oil by 1980. How relevant the potential savings from conservation of energy measures suggested by the OEP Report are to the question of whether or not to permit the construction of a plant at Colstrip cannot be known in the absence of more data regarding end-use of the power. Assuming that most of the power will start to flow to load centers in the Pacific Northwest in the mid-1970's and that the power will be used primarily for residential and industrial purposes, the State might address itself to such measures as more efficient home insulation and the use of taxes to encourage more efficient energy use in industries of the Pacific Northwest. These are but two of the mid and long-term measures suggested in the OEP study as real alternatives to the continuation of the construction of power plants to meet growing demand. Of course the State of Montana has no direct control over whether or not conservation of energy measures are implemented in those load centers to which power generated at Colstrip will flow. Yet the fact that these alternatives exist provides ample justification for the refusal of the State to allow its lands and culture to be disrupted in order to supply areas which have not implemented conservation measures. The State may want to withhold permission for the construction of the Plant at Colstrip pending an examination of implementation of conservation and other alternatives measures in the load centers to

which Colstrip power will flow. In any event, further examination of all alternatives should be made. The results of this examination should be published in another draft of the required environmental impact statement.

## CONCLUSION

While we believe that the State has made an admirable beginning of the arduous task of examining environmental impacts, we must underline the fact that the Draft is only a beginning. The Draft simply is not a satisfactory document on which to base a decision regarding the construction of the Colstrip Plant. We have indicated where we think the Draft is deficient. We think that the procedure to follow is circulation of another draft in which these deficiencies can be remedied.

Perhaps if the Colstrip Plant were but one, isolated plant, we would not be so concerned that the State comply rigorously with the Montana Environmental Policy Act. But, whether or not the North Central Power Study, ~~as such~~, is defunct, pressures for development on an enormous scale of Northern Plains coal and power facilities are destined to increase to levels which will be hard to resist unless the State is fully aware of the environmental problems involved. ~~State governments in the Northern Plains~~ will get buried in the rush of private and federal governmental interests to develop the riches underlying the Plains regions, unless these States begin early to examine ~~the~~ complex environmental and social problems of development. States must learn to extend their examinations into problem areas heretofore left to the federal government, such as alternatives to conventional power plants supplying multi-state areas. We ~~realize~~ that this Draft does not represent the total effort of the State of Montana regarding ~~electric power~~ production or strip-mining in Montana. Nevertheless, because of the importance of the Colstrip Plant decision, we feel strongly that the State should more fully examine the variables affecting this decision in another draft.

Student Environmental Research Center  
U of Montana, Missoula

Northern Plains Resource Council

TO THE STATE DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES

<sup>...no sent</sup>  
This statement is ~~being transmitted~~ by air to Miles City. Because  
of transportation difficulties <sup>they were not able</sup> ~~we will not be able~~ to attend the  
hearing. We are asking the Northern Plains Resources Council to  
read the statement in our absence. This statement was prepared by

Clancy Gordon

Arnold Silverman *AS*

Phillip Tourangeau *P.T.*

William Tomlinson *WDT*

John McBride *JM*



7) inadequate data throughout upon which to judge the Draft, and hence offer comment.

Comments upon specific portions of the Draft Supplement follow.

### Fluorides

According to the DS, the proposed Venturi scrubbers for the Colstrip generating plant should remove 97-99+ percent of the fluorides from the gaseous and particulate emissions of that "proposed plant" presently under construction. The Department of Health and Environmental Sciences utilizes a report from the Stauffer Chemical Company to demonstrate the efficiency of Venturi Scrubbers in removing fluorides from the Stauffer operation at Ramsey, Montana.

A 1972 study by the personnel of the University of Montana Environmental Studies Laboratory of fluoride accumulation in over 500 samples of flora, fauna and soil collected around the Stauffer Chemical Company's operation at Ramsey demonstrate the effects of fluorides that are not removed by their Venturi scrubbers. Fluoride analysis of 1971 and 1972 forage collected in the area demonstrate that forage on 11,520 acres (not including Stauffer Chemical Company's properties) contained from 35 to 55 ppm of fluoride (dry wt. basis). Furthermore the forage on 4,736 acres had accumulated 55 to 100 ppm of fluoride; and forage samples on 450 acres (again outside of Stauffer's property) had accumulated from 100 to 500 ppm of fluoride. Maps demonstrating fluoride levels in the Stauffer plant area are presented in the appendix of this statement.

Probably the most important data collected around the Stauffer Chemical plant which have the 97% efficient Venturi scrubbers is that the fluoride levels in forage collected from all 11 study radii (which covers 80 to 100 square miles) around the plant site were above the normal fluoride background level for forage of 7 to 10 ppm. Even more revealing is the

Therefore we cannot accept your conclusion that no fluoride damage will occur because your diffusion model demonstrates to you that the State ambient air fluoride standard will not be exceeded.

SO<sub>2</sub>

Adequate comment on this section is impossible since neither the refined diffusion model nor the new meteorological data are presented. Since the Draft Supplement has revised the maximum SO<sub>2</sub> concentration downward by a factor of 3 the importance of the model and meteorological data are obvious.

The DS states that those conditions necessary for the one hour state standard to be violated are "highly unlikely". There is no data to justify this statement in the DS. We submit that the dismissal of the possibility of the occurrence of conditions favorable for violations of State Air Standards as merely "highly unlikely" without further substantiation is a shirking of responsibility on the part of the Department of Health and Environmental Sciences. This is all the more obvious since the DS admits that the revised <sup>predicted</sup> SO<sub>2</sub> concentration could be  $\frac{1}{2}$  or twice actual levels, and that from the State's experiences violations of state standards do occur.

The SO<sub>2</sub> <sup>oxide</sup> section is further inadequate and deficient since there is a lack of substantiation for predicting F<sup>+</sup>, <sup>Nitrogen oxide</sup> NO<sub>2</sub> and particulate concentrations based upon their relative concentration ratios to SO<sub>2</sub>. <sup>oxide</sup>

Effects on Ecosystems

This section, we submit is again deficient and inadequate. Flourides at concentrations of less than 35 ppm in forage will cause damage to cattle. The Intalco Aluminum Company in Ferndale, Washington recently paid \$150,000 in damages to a farmer whose cattle were damaged by consuming

vegetation contaminated with  $F^-$ . The average flouride concentration in the forage was 26 ppm. The DS expects that "dangerous concentrations" of  $F^-$  are not expected to occur in vegetation based upon predicted ambient air flouride levels, but does not substantiate this expectation with data. Nor does it define "dangerous concentrations." Mention of long term concentration of flouride is made in reference to Ponderosa Pine 17 miles from Colstrip, but range grasses in the immediate vicinity of the plant site with 3 year life cycles, are not considered at all. We submit that the DS does not consider the effects of  $F^-$  on the ecosystem since wild indigenious animals are not mentioned at all.

Although the DS indicates that no damage to alfalfa by  $SO_2$  should occur, it is difficient in that it does not enumerate those studies upon which this indication is based. Literature on the effects of  $SO_2$  on vegetation is voluminous and research is continuous. No adequate comment is possible without the bases for the DS's indications of no  $SO_2$  damage to Alfalfa.

The DS is less certain about the synergistic effects of  $SO_2$  and other pollutants. It states that data on synergism is scarce, and that there is no indication from the paucity of data that synergistic process would occur which would damage vegetation. Prudence would seem to dictate that a lack of information and a paucity of data would not be the basis upon which to predict an event.

The section on Effects on Ecosystem is further inadequate in that there is no data supporting the expectation that the physical separation of the cooling towers and the stacks would prevent generation of significant

amounts of  $H_2SO_4$ . Although the climate in Colstrip is now dry, the DS ignores any increased humidity as a result of the operation of the cooling towers themselves. Clearly, a substantive statement <sup>on sulfate acid</sup> of  $H_2SO_4$  mist is possible only by considering increased humidity. The section is further deficient in that the environmental impact of the amount of acid expected to be formed, although "insignificant" is not considered, nor is a "significant generation of acid mist" defined.

#### Human Health

The subsection entitled human health is grossly inadequate. One need only refer to the record of the December 15th, 1971 hearing on the Anaconda <sup>sulfur dioxide</sup>  $SO_2$  petition to note the voluminous literature available on the health effects of air pollution. Such a vital subject as the effects of air pollution on human health deserves more than 5 sentences.

We simply have not had time to comment on the sections entitled, Water Use, Dry Cooling Towers, Powerlines, or Power Use.

#### Conclusions

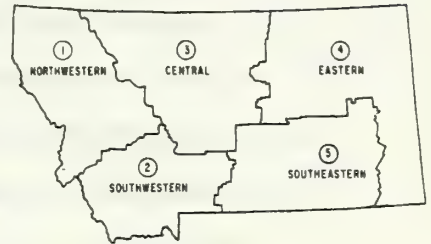
In conclusion we wish to reiterate our <sup>objection</sup> ~~object~~ to the distribution of supplemental materials one day prior to a public hearing which will consider the materials. We believe that the supplemental draft in no way eliminates the deficiencies noted in the Draft Statement and in fact is subject to the same shortcomings noted in the draft statement. We therefore urge that the department prepare a revised draft environmental impact statement, as recommended by the Environmental Quality Council, <sup>Student Environmental Research Center</sup> EDF and ~~SERC~~ addressing itself to the full impact of this development.

Environmental  
Defense  
Fund

EDUCATION -- CONSERVATION

# Montana Wildlife Federation

AFFILIATE OF NATIONAL WILDLIFE FEDERATION



STATEMENT PREPARED FOR THE JANUARY 5th PUBLIC HEARING CONCERNING  
MONTANA POWERS'S APPLICATION FOR CONSTRUCTION OF A COAL FIRED  
GENERATING PLANT AT COLSTRIP.

My name is Robert Lynam and I reside at 501 Palmer, Miles City,  
Montana. I am president of the Montana Wildlife Federation and this  
statement reflects the general policy of that organization.

I have read the draft copy of the Environmental Impact Statement as  
well as the North Central Power Study and these documents form the basis  
of my remarks.

The Federations policies reflect concern with the entire environment  
and while I am concerned with the total environmental consequences of the  
proposed action, time forces me to narrow my comments to a few. Omission  
of comment does not imply consent or agreement with the overall plan for the  
plant or for the energy generation complex in southeastern Montana.

There are two general topics that I will discuss in detail and they  
are: Air enmissions and water demands.  
AIR EMISSIONS:

The impact statement raises the question about the Jim Bridger plant in  
Wyoming. What will be the effect of enmissions even if the plant complies?  
Nowhere in the statement do I find this question answered, either about the  
Bridger plant or the plant at Colstrip. However, the writers summarize in



in Item 4 that air quality degradation is a probable adverse effect.

I question also what guarantees that the emission equipment will function as designed? Will the Air Quality Bureau have the ability to stop or scale down operations if the equipment fails? Past experience has taught us that once the investment has been made the regulatory agencies become ineffectual.

The Air Quality Bureau admits in the statement that they expect violations of the 0.25 ppm 1 hour standard for sulphur dioxide. It is difficult to have confidence in these statements when the report states the results are preliminary since input meteorological parameters were not founded facts.

#### TRACE ELEMENTS

The statement contains this quote related to trace elements. "When millions of tons of coal are burned the trace elements become significant potential pollutants." The writers of the statement conclude and I quote, "Very little is known about the trace element content of the coal to be burned at Colstrip. Thorough comprehensive sampling for trace elements has not been done on this coal.

It is important to know how much of these elements will be emitted but it is vital to know the impact of these trace elements upon animals living a normal but stressful life in their natural environment. Will the hunters find eating birds and animals of the area hazardous because of high Mercury levels? The content of mercury and the removal of mercury are admittedly unknowns.

What are the expected deposition levels of fluoride upon the vegetation and ultimately the levels in the animals of the area? What is the fluoride content of the coal and how much will be removed?

#### WATER VAPOR:

The statement contains an estimate of 4 million pounds of water vapor released per hour from the cooling towers and the stacks.

Winter is a very critical time for animals. Will the snowfall increase? Normally available foods and feeding areas may become unavailable to these wintering animals.

#### WATER DEMANDS.

The water needs for the plant at Colstrip are estimated at 13,000 acre feet per year. Withdrawals in this amount are not expected to have a significant/<sup>effect</sup> on the present flows of the Yellowstone River. However, the Bonneville Power Administration refers to at least two more plants in the Colstrip area in the near future. Other energy companies are planning additional generating plants as well as gasification plants for southeastern Montana.

It is these total water needs which are of great concern to the Federation.

Stabilized flows in the Yellowstone drainage will have adverse effects on the aquatic communities. Paddlefish studies indicate that spawning is triggered by the spring increases in flows. Sauger and walleye depend on clean gravel bars for successful spawning. It is the increase in flows which cleanse the gravel bars of the accumulation of silts.

The water demands can be reduced by incorporating dry cooling towers instead of the evaporative towers. The Federation recommends dry cooling despite the added costs.

The Federation is deeply concerned with the inefficiency of conversion of coal to electrical energy and the high transmission losses. Better methods must be found<sup>to</sup> convert the non-renewable coal to electrical energy.

The Bonneville Power Administration has requested permission from the Forest Service to run the Colstrip generated power via high voltage

transmission lines through the Magruder Corridor. The Federation opposes this action through this candidate wilderness area.

In summary I find it very difficult and frustrating to make factual comments about the probable impacts of the Montana Power generating plant at Colstrip when the draft statement contains statements such as, efficiency unknown, meteorological parameters were not founded facts, no background information, etc. The Montana Wildlife Federation does not oppose the mining of eastern Montana coal, with proper safeguards, but we oppose the granting of this permit until the impacts are more accurately judged and degradation will not occur.

STATEMENT OF UNITED STATES FOREST SERVICE

Regarding the Draft

ENVIRONMENTAL IMPACT STATEMENT

For

COLSTRIP POWER PLANT

My name is Dan MacIntyre. I am Forest Supervisor of the Custer National Forest, whose headquarters are at Billings, Montana. I am here to make a statement on the behalf of the Regional Forester of the Northern Region of the Forest Service, Steve Yurich, whose headquarters are at Missoula, Montana.

We have previously submitted a written response to the draft Environmental Impact Statement (EIS) to the State Air Quality Bureau and won't go into the details of that document here today. We would, however, like to summarize our views for the hearing record.

The greatest concern which specialists, line, and staff officers of the Forest Service in the Northern Region have expressed, lies not with the Colstrip Power Plant per se, but with the larger areas and issues which will surely follow and hence are associated with the installation of these first two plants. We suggest, therefore, that we cannot put the plant itself in the proper perspective for meaningful comment except as it relates to the total context of these larger areas and issues.

Our first and primary concern, therefore, is for the critical need for a more comprehensive study to assure orderly development and the production of needed power from the entire Fort Union Formation Area, in a manner which will prevent, or at least minimize degradation to the environment, traditional uses, and human resources of the area affected.

We believe that an approval for construction and operation of the first two relatively small facilities discussed in the Environmental Impact Statement would act as a precedent for additional plants in the area. An analysis of the cumulative effects of the ultimate amount of mining and the number, size, and location of plants is needed before piecemeal development is undertaken.

Our second area of concern is for the transmission network issuing from the power plant or plants. We are informed that 350 MW of the 700 MW to be produced from the first two proposed plants at Colstrip would be wheeled to the West Coast. This same informational material shows that an additional 1,050 MW would go west from the second two plants being planned by Montana Power and Puget Sound Power and Light. Thus far, we have been unable to determine where the balance of available power will be directed. We are most anxious to find this out since it is not only possible but quite probable that transmission lines will be planned which would have to cross National Forest lands west of Colstrip.

Some prominent transmission line corridor possibilities, in light of the above discussion, are:

1. Colstrip, Montana, west to Anaconda, Montana, westerly across the Sapphire Range and Bitterroot Mountains via the Magruder Corridor to south of Lewistown, Idaho, then westerly to the load centers.

2. From Anaconda, Montana, to Hot Springs, Montana, to Spokane, Washington, and south and west to load centers.

3. From Anaconda, Montana, to Hot Springs, Montana, following the present Dworshak Hot Springs Transmission Line to west of Dworshak Dam near Ahsahka, Idaho, via the lower Snake River area to the load centers.

The above possible transmission line corridors could involve directly and indirectly National Forest system lands located on eight National Forests.

There is no evaluation as to the possible transmission line corridors, transmission line capacities, and the environmental impacts involved in moving the needed electricity to the Pacific Northwest load centers.

The report of the Senate Committee on Interior and Insular Affairs, concerning problems of Electrical Power Production in the Southwest (released in the fall of 1972) points out in the Findings section on page 29:

"Although the current controversy over the power development in the Southwest has not greatly highlighted transmission lines, it is probable that the ultimate transmission grid contemplated will pose the most severe problems of aesthetic insults to the region."

In considering potential transmission line corridors where National Forest system lands are involved, there are land and resource management considerations involved which must be solved and alternatives considered before final decisions and authorizations can be made. Comprehensive land and resource evaluations and analysis must be completed to ascertain that the proposed transmission line corridor(s) is consistent with other planned activities and would not create serious adverse consequences for long term management. Determination must be made that the portion of a proposed corridor located on intermingled or adjacent land would not adversely and seriously offset important National Forest system values or preclude the achieving of National Forest objectives. Determination must also be made that the proposed corridor location on National Forest system lands would not adversely or seriously affect the environmental quality of intermingled or adjacent land of other ownerships.

Other factors which must be considered are primitive area studies, social and economic impacts, pending legislative action, environmental statements required by the National Environmental Policy Act, public involvement, coordination between all utilities including public,

private, and Federal agencies involved in the production transmission and marketing of electricity. Until the above is accomplished and all alternatives considered, we consider that options related to the allocation of National Forest lands from a diminishing land base must be kept open. Determination of locations and authorization for transmission line cordidor(s) on National Forest land such as discussed above, would require in-depth analysis and Environmental Analysis and Statements.

Our third area of concern relates to stack emissions from the proposed plants. National Forest lands nearest to the proposed Colstrip plant lie approximately 20 to 25 miles to the east. Due to westerly prevailing winds, the projection for uncontrolled emissions of 3.2 pounds per hour of fluorides and 0.23 pounds per hour of mercury are particularly worrisome. These are cumulative poisons and affect plants and animals at relatively low concentrations. Livestock, for instance, develop fluorosis if grazing is done on vegetation containing more than 35 ppm fluoride.

To summarize then, we have three chief concerns:

1. The need for a more comprehensive study for the total impacts of coal development in the entire Fort Union Coal Formation Area.
2. The need for more information and evaluation of the impacts of the transmission network following power plant development.

3. The cumulative effects of stack emissions on National Forest lands lying east of the proposed Colstrip plant.

We would urge that the above factors be more fully considered and evaluated before further land use commitments are made.

ORAL TESTIMONY OF MR. JAMES M. BENSON AS TRANSCRIBED FROM TAPE MACHINE

I don't suppose I'm any different than any of the rest of us that are here. I probably have a personal reason for coming up and stating my views and mainly I don't see any objections to this issuance of this permit to Montana Power because we surely will need the power in days to come because I know my wife would be awful unhappy if I told her she couldn't use the vacuum or had to do without a refrigerator, but I have followed the construction work most of my life, I've farmed and ranched before that and this project out here affords a lot of us working people the opportunity for year round employment and this I think is what most of us seek as some source of financial security. We as a family discussed and tried to come to a reasonable conclusion as to why we should or shouldn't move to Colstrip and have the chance for year around employment. We like outdoor activities and we hate to see the air, the water, the earth quality of it impaired in any way, and I don't think this steam plant will do this, so I represent myself, mostly, and I the consensus of opinion that I arrived at from talking to the working man at the mine and around Colstrip who work in the mining operation and on the plant seems to be that they find no objection either. As far as strip mining goes I don't think there is many people in Montana that would like to mine that coal underground. I know I wouldn't and I suppose then we would have to import miners from back East to come out here and mine the coal underground, so I don't think we would be doing the young people of Montana any favor by trying to mine it in this manner, so I think that possibly that this is the most economical and most feasible way to mine the coal and to insure us that we have an adequate supply of electricity in the future. Thank you.



else. They are just designed for normal stream flow. I happened to be president of the Kinsey irrigation Association in 1961, and we had Cats right down in the bottom of the river trying to get water enough for our farmers to irrigate. Now if Montana Power, whoever it is, would like, we know 90% of the time there is plenty of water running down this Yellowstone River, but what about that 10% of the time. Now are they willing to come in and construct devices for our irrigation projects to get that water out when it is below normal stream flow? Now this is one question I would like to know. There is quite a little water going down there, but we have to have it. Now if they are willing to come along and construct these devices to get the water out, fine, then I would like to go on record from the Tongue River Yellowstone Beet Association as we are not strictly against the two plants or anything else, but we want to know whether we are going to have water to maintain our crops. Now, for instance a dry land farmer probably averages \$30 - \$40 - \$50 an acre off his crops, an irrigated farmer averages, talking gross, from \$100 - \$500 an acre off of his crops. My budget would look pretty dim, I'd tell you, if I had 175 acres and I got \$35 an acre off of it.

That's all I have to say.

Thank you.



January 5, 1972

I am Mrs. Leon Hicks. I represent the Billings Chapter of the National Audubon Society with membership of 70 families.

We want to thank the State Board of Health for this opportunity to voice some of our concerns about the plant now under construction and of the plants planned for this area in the future.

Audubon does recognize that a valuable resource is present in great quantities and that there exists a demand for it. Audubon questions the haste with which industry is moving before adequate safeguards over soil, air and water can be established.

As we understand the situation, the only permit needed for operation of this plant is the one concerning the installation of air pollution control equipment. The entire plant abuses several areas of the environment and the delay in filing the impact statement by Montana Power Company violates the intent of the NEPA act and the right of the citizen to know about proposed development in our state.

Montana Power has filed a request at the Rosebud County Courthouse for rights to 59 billion gallons of water a year. They have filed for approximately 112,000 gallons a minute while insisting to the public that they will be using only 8000 gallons a minute in the operation of this plant. Why did they file for such an excessive amount?

Who is the authority for the statement that removing this amount of water from the Yellowstone would not harm the river or the plant and animal life dependent upon its water? Considering other demands already made upstream upon the river, is there any basis for such confidence in the rivers ability to withstand this heavy demand upon it.

Audubon urges that dry cooling towers be used. There is a shortage of fresh water in the United States and it just is not reasonable to use this resource in such an extravagant fashion.

Montana Power claims that they are bringing jobs to Montana so that our youth does not have to go elsewhere for employment. The impact statement says 800 to 900 jobs will be available during the building of this plant, but less than 100 will be needed to operate it and the strip mining operation later. Where will the extra 800 men work after the plant is finished in 1976? Who will use their former housing?

We must presume that city services and schools will be expanded to accomodate the extra people for four years. Is this really a sensible 5 year plan for Montana?

Consider the economic catastrophe when the government pulled out of Glasgow and Conrad. Is it desireable to replace a stable agricultural economy with a boom and bust construction economy? Audubon questions the validity of Montana Power's assertion that they are improving the economy here for anything but a very short period of time. The unemployment problem will be MONTANAS!

The Department of the Interior has conducted a study of the Four Corners steam generation area in the southwestern United States and has drawn the conclusion that it is much cheaper to ship the coal to the population centers for conversion into energy than it is to build mine mouth plants and then ship the energy. In Eastern Montana, the major rail lines already exist for the shipping of the coal to the eastern or western population centers.

This one plant projects three separate power lines to Billings. Since 20 acres of land is condemned for every mile of power line built, this visual and land consuming pollution could be avoided if the coal were shipped to population centers instead of building future

mine mouth plants.

Why degrade Montana's air and water and land when it is cheaper to ship the coal to the consumer's area?

What assurance do we have that existing pollution controls will be honored by the Power companies and if not honored, what assurance do we have that violations will be corrected and the law enforced? Past performance of the Power Companies does not engender confidence.

Granting a permit to operate means that coal must be mined and with strip mining now permitted under existing laws, it will be strip mined since this is the cheapest and fastest way to utilize the resource. Would it make more sense to deep mine the coal and thereby exercise the subsurface rights while preserving surface rights and maintaining the environment? This method of mining would create many more permanent jobs than strip mining will.

If there really is such an energy shortage and they really do need this coal now, wouldn't they be happy to pay the extra price of deep mining so as not to cause the disruption of people and wildlife and plantlife?

Audubon recognizes other values besides a dollar and how many acres it takes to graze a cow. Several other values can be placed on any given piece of real estate. How long will it take to grow the trees again? The grass? Or rebuild the soil?

If there is any other way to get the coal, why should strip mining even be considered when it is common knowledge that other strip mined areas are useless for generations.

Which is really more important? Preserving the land for the next generations or destroying it during this one to satisfy an artificial urgency for more energy in order to manufacture throw away containers, gadgets that comb your hair, brush your teeth, and open your cans. Energy to produce cars with many times the horsepower needed to get from here to there, light our streets like midday at midnight, illuminate billboards, keep the neon flashing bigger and brighter far into the night.

Audubon is concerned the power companies don't really want us to know the truth about the energy situation. Why do they continue to advertise to increase demands for a product they say is already in short supply?

Audubon is concerned that the state might really believe that 500 foot smokestacks or even taller ones somehow lessen the pollution pouring from them. We have only this one world.. Does it really make a difference how high they shoot the pollutants as long as they remain in our world? From this one plant 266 pounds of dust an hour, 6820 pounds of sulphur dioxide an hour, a maximum of 4774 pounds an hour of nitrogen oxides, with a yearly maximum of 14 tons of water vapor all add to the pollution we already have... Let us not be perpetrators of another "Legal crime" against the State of Montana.

Furthermore, the one in Montana, with million tons of carbon dioxide and 3.1 million tons of water vapor.

Presented To The State Board  
Of Health Concerning The Pro-  
posed Steam Generation Plant  
At Colstrip.

Miles City, Montana

January 5, 1973

By Don Bailey  
Forsyth, Montana

I am Don Bailey. My livelihood is sustained from a family ranching operation approximately 10 miles southwest of Colstrip. The threat that accumulative pollution effects may impose upon my future welfare, both physically and economically, have prompted my remarks.

Because others have or will deal in specifics of the impact statement, I have chosen to comment more in generalities.

The statement concludes, in many instances, that there probably is not enough information available to properly determine the long-range effects that the power plant may have on the environment and eco-systems.

The only criteria that must be met are the State and Federal ambient air quality standards. That these standards are considered adequate, is only confirmed in the impact statement, by the Administrator of the Environmental Protection Agency in establishing these standards. The national secondary ambient air quality standards are those which, in the judgment of the administrator, based on air quality criteria, are requisite to protect the public welfare from any known or anticipated adverse effects associated with air pollutants in the ambient air.

Admissions are made throughout the impact statement that long range adverse effects will undoubtedly be imposed upon the environment. This appears to me to be an anticipated event, and by definition of the Ambient Air Quality Standards, would mean that it cannot meet these standards. There will be pollution, there will be adverse effects, and they are being anticipated now.

The State Board of Health wrote this impact statement on the basis of information supplied them by the Montana Power Co. Much of the back-ground research was done by firms or agencies that were partially or wholly funded by the Montana Power Co. or other utility oriented industries.

This situation raises the question as to whether every bit of information, both negative and positive to their plans, has in fact, been made available to the State Board of Health.

We in America, have continuously introduced substances into our environment, with good intentions, that were judged to be completely safe. Later, as in the case of DES in livestock feeding, many food additives, and medicinal drugs, it was discovered that they created a definite health hazard. No tolerance was allowed as will be the case of the fluorides, which have definitely been linked with heart disease and bone deterioration, or the radioactive ones which can cause cancer; these being only two of many dangerous elements resulting from the burning of coal. The reasoning for the variations in this interpretation smells of political overtones.

I fear that one day we will discover our tolerance of these deadly substances, only for the economic benefit of our industries, was also a grave error in human judgment. Is the health and welfare of the people of Montana and the Colstrip area in particular, to pay for this kind of irresponsible actions?

I might add that I realize the economic importance that coal mining and its related activities have to the men and their families who work at Colstrip, but because they are on the other end of the philosophical ladder on this matter does not make them immune from the pollutants of this project. The wind does not always blow from the west at Colstrip.

I will briefly list some other problems, as revealed to me by air quality experts with whom I have been in contact, that may result from the 700 Meg. Watt plant.

1. Ponderosa pine within a five mile radius downwind may be severely damaged or completely destroyed by fluoride emissions. The impact statement says that no control equipment or ambient air quality standards will be in effect for fluorides.
2. Acid rains resulting from present annual and fall and large amounts of evaporated water from the plant, combining with sulfur dioxide emissions, may reduce plant growth in the surrounding eco-system by 1/3 within five years. This is recognizing the advertised 99.5% efficiency in removing particulate and SO<sub>2</sub>.
3. Dr. Ernest H. Abicht, a research scientist for the Environmental Defense Fund says the loss of 1% efficiency of the control equipment will increase the SO<sub>2</sub> emissions four times. This, of course, can be taken care of by the 24 hour grace period allowed every four days, whereby, any amount of pollutants into the ambient air will be allowed for 24 hours.
4. These same air quality experts have indicated the most dangerous of all effluents may be the trace elements.

I quote from the impact statement, "Very little is known about the trace element content of the coal to be burned at Colstrip. Thorough comprehensive sampling for trace elements has not been done on this coal. Mercury and fluorine have been the trace elements given the most attention, but others may prove to be serious pollutants, especially radio-active ones." (unquote)

I have pointed out only a few of many inconsistencies in the impact statement. There have been and will be some other circumstances evolve from this action which I feel deserve consideration.

1. We will have the creation of a potentially dangerous pollutant with inadequate regulations to assure that even the tolerable or acceptable degree of pollution will be maintained.
2. We will have a long term accumulation of toxicants in flora and fauna . The effects of this accumulation may not be readily recognized until serious damage has been sustained.
3. There is apparently no legal recourse for those in the area who may be damaged physically or economically.
4. We have had an apparent after-the-fact atmosphere which has shrouded this project from its inception. By after-the-fact, I refer to the publishing of the impact statement, the construction application, the determination of when the permit is required and finally the ultimate issuance of the permit. I detect a very dangerous precedent being set if this is a format for future projects.
5. We have an irreversible commitment of four precious natural resources, land, air, coal, and water at a 12% efficiency. It does not seem that this is commensurate

with the needs of a nation that is supposedly on a  
brink of a major energy and natural <sup>resource</sup> crisis.

In conclusion, in view of my testimony, I believe it would  
be very commendable, courageous, and politically inexpedient  
if the Board of Health were to refuse the permit application  
at the time when it is determined necessary for construction  
to begin or continue, until such time as a more educated and  
responsible decision can be made.



WELL REALIZING THAT A STATEMENT AT A HEARING OF THIS KIND SHOULD BE CONSTRUCTIVE, AND THAT MY COMMENTS WILL PROBABLY BE SIGHTED BECAUSE THEY ARE NOT DIRECTLY RELATED TO THE CONTENT OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT, I FEEL THAT IT IS MORE IMPORTANT TO TAKE A BROADER VIEW OF THE IMPLICATIONS OF THE COLSTRIP PLANTS, THAN TO MERELY COMMENT ON WHAT I CONSIDER ARE GROSS INADEQUACIES IN THE IMPACT STATEMENT.

I CONSIDER THIS HEARING, AND ALL OF THE EVENTS LEADING UP TO IT, TO BE A WASTE OF TIME, EFFORT, AND MONEY. I BELIEVE THAT THE SO-CALLED CONSTRUCTION PERMIT HAS BECOME A FRAUD AND A FACADE, AND WHILE THE MONTANA POWER CO. IS PROBABLY WITHIN THE LEGAL LIMITS OF THE LAW, THEY HAVE VIOLATED THE INTENT, AND PURPOSE OF THE LAW, AND HAVE MADE A MOCKERY AND A LAUGHING-STOCK OF THE BOARD OF HEALTH, THAT ADMINISTERS THE LAW, THE LEGISLATURE THAT ENACTED THE LAW, AND THE STATE, AND ITS PEOPLE THAT THE LAW WAS DESIGNED TO PROTECT.

THERE APPEARS TO BE UNINIMITY BETWEEN MONTANA POWER CO.'S HIERARCHY, AND ME ON ONE POINT, AND THAT IS THAT THE PENDING APPLICATION FOR PERMIT WILL BE SUMMARILY APPROVED, AND THAT APPROVAL FOR OTHER PLANTS AT COLSTRIP WILL BE ROUTINELY APPROVED, AS WELL.

THE PROPOSED CONSTRUCTION OF A FIVE-FOOT PIPELINE FOR WATER, WHEN ONLY A TWO-FOOT LINE IS REQUIRED TO COOL THE TWO PLANTS UNDER CONSTRUCTION; COUPLED WITH THE ADMISSION OF A WESTERN ENERGY CO. OFFICIAL TO A GROUP OF PEOPLE AT COLSTRIP THAT SEVEN PLANTS, WITH A TOTAL GENERATION CAPACITY OF ~~20~~ 10,000 MEGA-WATTS, WILL EVENTUALLY BE BUILT AT COLSTRIP IS HARDLY A COINCIDENCE.

IS THE ONGOING CONSTRUCTION OF THE POWER PLANTS, THE SURVEYING OF THE PIPELINE ROUTE, THE CONSTRUCTION OF ADDITIONAL TRAILER COURTS AT COLSTRIP, THE CONSTRUCTION OF TRANSMISSION LINES, CONSISTENT WITH ANY DOUBTS AS TO THE FINAL DISPOSITION OF THE APPLICATION FOR CONSTRUCTION? I THINK NOT, AND ONCE AGAIN I BELIEVE THAT MONTANA POWER AGREES WITH ME.

I QUOTE FROM THE IMPACT STATEMENT, UNDER EFFECTS ON THE ECOSYSTEM ON PAGE 22: "WHAT THE LONG RANGE EFFECTS OF SO<sub>2</sub>, NO<sub>x</sub>, FLUORIDES, MERCURY AND

OTHER EMISSIONS FROM THE PROPOSED PLANT WILL BE, IN FACT, UNABLE TO PREDICT AT THIS TIME.....OVER A PERIOD OF YEARS, THE POLLUTANTS MAY BUILD UP TO LEVELS THAT SERIOUSLY DISRUPT THE ECOSYSTEM.....A QUANTITATIVE ESTIMATE OF THESE EFFECTS IS IMPOSSIBLE AT THIS POINT IN TIME, GIVEN OUR PRESENT UNDERSTANDING OF THE FATE OF THE POLLUTANTS IN THE ECOSYSTEM." DR. ERNEST HABIGT, JR., OF THE ENVIRONMENTAL DEFENSE FUND MADE THE FOLLOWING COMMENT ON THIS PART OF THE IMPACT STATEMENT: "INSTEAD OF DELVING INTO THIS SUBJECT, THE DRAFT ENVIRONMENTAL IMPACT STATEMENT APPEARS TO SUCCEED TO HELPLESSNESS, AS IF THE FATE OF THE REGION WERE COMPLETELY IN THE HANDS OF THE MONTANA POWER CO."

PRELIMINARY AIR SAMPLING WAS DONE PRIMARILY ALONG DUSTY COUNTY ROADS, AND THE MAIN, RURAL SAMPLING SITE, MENTIONED ON PAGE 13 OF THE IMPACT STATEMENT, WAS IN ONE OF MY NEIGHBOR'S YARDS, DOWNWIND FROM ALL OF THE DAILY TRAFFIC THROUGH THE YARD, AND IN CLOSE PROXIMITY TO A TRASH-BURNING BARREL. I MENTION THIS MORE AS A PROTEST TO THE ACCURACY OF THE STATEMENT, RATHER THAN THE EFFECT IT MIGHT HAVE ON THE APPLICATION'S FINAL DISPOSITION. I GUESS WHAT I AM TRYING TO SAY IS, THAT IN THE VERY LIMITED AREA OF MY PERSONAL EXPERTISE, THE INPUT INTO THE IMPACT STATEMENT IN THE CRITICAL AREA OF PRESENT AIR QUALITY IS ERRONEOUS.

THE ONLY CONSOLATION THAT I CAN FIND IN THE IMPACT STATEMENT IS FOUND IN THE SUMMARY WHICH SAYS: "THE LONG-TERM ADVERSE EFFECTS MAY WELL OUTWEIGH THE SHORT-TERM GAINS."

WHAT I FEAR IS THE PROSPECT THAT BY APPROVING THIS FIRST FACILITY A PRECEDENT WILL BE SET FOR SUBSEQUENT FACILITIES, AND THAT THE BIG SKY COUNTRY WILL ENVIRONMENTALLY SUBSIDIZE THROUGH INEFFICIENT GENERATION, AND INEFFICIENT TRANSMISSION, NON-MONTANA ELECTRICITY CONSUMERS, AND NON-MONTANA FINANCIAL INVESTORS.

A FRENCH PHILOSOPHER NAMED RAYNAL ONCE SAID: "THERE IS AN INFINITY OF POLITICAL ERRORS WHICH, BEING ONCE ADOPTED, BECOME PRINCIPLES." I HOPE AGAINST HOPE, AND PRAY AGAINST MY INTUITION, ADMITTING THAT I AM BIASED, SELFISH,

AND CYNICAL, THAT YOU WILL REFUSE THE APPLICATION FOR CONSTRUCTION.



A STATEMENT BEFORE THE DEPARTMENT OF HEALTH & ENVIRONMENTAL SCIENCES COMMITTEE IN PUBLIC HEARING ON THE MATTER OF MONTANA POWER'S APPLICATION FOR A PERMIT TO CONSTRUCT GENERATION FACILITIES AT COLSTRIP

MY NAME IS PETER LOMBARDOZZI, I AM THE PRESIDENT OF THE SOUTHEASTERN MONTANA BUILDING TRADES COUNCIL, AND I AM ALSO THE BUSINESS MANAGER OF THE INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS, LOCAL 532, AND THE FOLLOWING STATEMENT IS PRESENTED ON BEHALF OF BOTH ORGANIZATIONS.

THE SOUTHEASTERN MONTANA BUILDING TRADES COUNCIL IS AN AFFILIATION OF THIRTEEN CONSTRUCTION UNIONS HAVING A COMBINED MEMBERSHIP OF WELL OVER 3,000 MEMBERS. ONE OF OUR FUNDAMENTAL CONCERNS AS A LABOR UNION ORGANIZATION IS A CONTINUING SUPPLY OF WORK FOR WAGE EARNERS AND OF COURSE, THIS IS OUR FIRST INTEREST IN THE DEVELOPMENT OF THE MONTANA POWER COLSTRIP STEAM PLANT PROJECT.

THE DEVELOPMENT OF MONTANA POWER ELECTRICAL ENERGY COMPLEX WILL PROVIDE A NEED FOR A WIDE VARIETY OF PHYSICAL AND TECHNOLOGICAL SKILLS, NOT ONLY FROM THE INITIAL CONSTRUCTION OF THE FACILITIES, BUT FROM THE OPERATION AND PRODUCTION OF THE PLANTS. WE ARE CONVINCED THAT MONTANANS WILL BENEFIT FROM THE JOB IMPACT ON THE ECONOMY FROM NOW ON.

THE RESULTING JOBS EFFECT NOT ONLY THE MEN AND WOMEN DIRECTLY EMPLOYED BUT EVERY MEMBER OF THEIR FAMILIES. WHEN PEOPLE ARE ABLE TO WORK, THEY SPEND THEIR MONEY ON GOODS AND SERVICES PROVIDED BY BUSINESSES WHO IN TURN HAVE TO HIRE MORE PEOPLE TO PROVIDE THE ADDED SERVICES, AND IT GOES ON AND ON.

PEOPLE WHO ARE ABLE TO WORK, ARE ABLE TO PAY TAXES. MOREOVER, THE GENERATING FACILITIES THEMSELVES WOULD PROVIDE AN ADVANTAGEOUS TAX BASE. THE PEOPLE IN MONTANA SHOULD BENEFIT FROM THE ADDITION OF THIS TAX BASE TO THEIR OTHER TAX ROLLS.

IN ANOTHER SENSE, THE JOBS PROVIDED WILL AFFORD MORE OF OUR YOUNG PEOPLE WHO HAVE COMPLETED THEIR EDUCATION AND ARE LOOKING FOR A CAREER AND A WAY TO REMAIN IN THE STATE A CHANCE TO STAY IN MONTANA AND GROW WITH MONTANA.

WE BELIEVE THAT MONTANA'S NATURAL RESOURCES HAVE TO BE DEVELOPED IF MONTANA IS TO GROW AND PROSPER, AND THE WELL BEING OF ITS PEOPLE DEPENDS HEAVILY ON THIS GROWTH.

ROLLING PLAINS OF SAGE-BRUSH AND GRASS ARE PLEASING TO THE EYE BUT UNFORTUNATELY FOR A MAJORITY OF THE PEOPLE IN THE STATE, IT CANNOT FEED A FAMILY, SEND A BOY TO COLLEGE, BUY A HOME, OR INSURE SOME KIND OF FINANCIAL STABILITY FOR THEM. DEVELOPMENT OF OUR NATURAL RESOURCES CAN DO THIS.

WE WISH IT PLAINLY UNDERSTOOD THAT WE ARE AS CONCERNED ABOUT OUR ECOLOGICAL ENVIRONMENT AS ANYONE ELSE. WE ARE IN ACCORD WITH THE PREMISE THAT ANY DEVELOPMENT WHICH AFFECTS OUR ECOLOGY SHOULD HAVE STRONG ENVIRONMENTAL CONTROLS TO INSURE THE QUALITY OF OUR WATER, AIR, AND LAND. WE ARE NOT INTERESTED IN CREATING JOBS TO DESTROY OUR ENVIRONMENT!

YET WE TAKE THE POSITION THAT MONTANA CAN DEVELOP ITS NATURAL RESOURCES, PROVIDING WORK OPPORTUNITIES AND GROWTH FOR ITS PEOPLE AND AT THE SAME TIME ENJOY A CLEAN ENVIRONMENT AND ECOLOGICAL BALANCE. WE IN LABOR HAVE SEEN GIANT TECHNOLOGICAL STEPS FORWARD TAKEN BY INDUSTRY AND HAVE PARTICIPATED IN PROJECTS TO REDUCE OR ELIMINATE EXISTING POLLUTION PROBLEMS AND CONTROL FUTURE SOURCES OF SUCH DIFFICULTIES. WE HAVE PARTICIPATED IN THE CONSTRUCTION OF COAL-FIRED STEAM PLANT PROJECTS FROM THE VERY FIRST ONE THAT WAS BUILT. WE HAVE BEEN 'ON THE SPOT WITNESSES' TO THE ASTOUNDING ADVANCES MADE BY THE INDUSTRY IN DEVELOPING TECHNIQUES TO ELIMINATE POLLUTION. WE ARE EXTREMELY CONFIDENT AND OPTOMISTIC THAT AMERICAN KNOW-HOW WILL CONTINUE TO DEVELOP BETTER TECHNOLOGY TO ELIMINATE POLLUTION PROBLEMS.

WE HAVE STUDIED MONTANA POWER'S ENVIRONMENTAL CONTROL TECHNIQUES PROPOSED ON THIS PROJECT AND ARE CONVINCED THEY ARE GOING TO UTILIZE THE BEST METHODS AVAILABLE IN POLLUTION CONTROL AT THE PRESENT TIME. WE ALSO BELIEVE THAT WHEN AMERICAN TECHNOLOGY PROVIDES BETTER METHODS AND SYSTEMS OF CONTROL, THEY WILL UTILIZE THOSE METHODS ALSO, BECAUSE NO ONE, BE THEY GOVERNMENT, INDUSTRY, OR WORKERS, WILL ANY LONGER IGNORE POLLUTION PROBLEMS OF OUR LAND, WATER, AND AIR. ENVIRONMENTALISTS HAVE DONE AN EXTREMELY GOOD JOB OF WAKING UP AMERICA TO THE CONSEQUENCES OF POLLUTION.

OUR UNIONS ALSO KNOW THAT AN ELECTRICAL ENERGY CRISIS IS AT HAND, AND THAT THE LOW-SULPHUR CONTENT COAL SUPPLY THAT IS IN GREAT ABUNDANCE IN MONTANA IS THE MOST ECONOMICAL METHOD OF GENERATING ELECTRICAL ENERGY FOR MONTANA AND OTHER STATES IN NEED OF SUCH POWER.

IT WOULD BE DANGEROUSLY NAIVE FOR MONTANANS TO BELIEVE THAT THEY CAN ISOLATE THIS RESOURCE FROM DEVELOPMENT WHEN THE NEED FOR IT IS SO GREAT IN OUR UNITED STATES. SINCE IT HAS TO BE DEVELOPED, WE BELIEVE THAT IT SHOULD BE DEVELOPED BY MONTANANS, IN MONTANA, FOR THE BENEFIT OF ITS PEOPLE! MOREOVER, IT THIS DEVELOPMENT IS TURNED DOWN OR NEEDLESSLY DELAYED, THE FORCE OF 'UNMET DEMAND FOR POWER' IN AREAS AROUND US MIGHT CAUSE THIS TO BE UNDERTAKEN BY OTHERS AT A LATER DATE ON A SPEEDED UP OR CRASH BASIS WITHOUT REGARD TO OUR ENVIRONMENTAL QUALITY. WE SIMPLY CANNOT STAND BY, TAKING NO ACTION, OR ALLOWING ANY ACTION BY MONTANA CONCERNS, TO DEVELOP THIS POWER SOURCE. IF WE DO, WE MIGHT WELL LOSE THE INITIATIVE TO OUTSIDE INTERESTS FOR ITS DEVELOPMENT.

IN SUMMARY, I WOULD POINT OUT AGAIN:

THAT WE BELIEVE MONTANA POWER'S GENERATION PROJECT AT COLSTRIP WILL CREATE NEEDED JOBS IN MANY CATAGORIES OF WORK NOW AND IN THE FUTURE: JOBS THAT ARE VITAL TO THE CONTINUED HEALTHY GROWTH OF MONTANA'S ECONOMY.

THAT WE BELIEVE THE EXTENDED TAX BASE THIS COMPLEX WOULD BRING CAN ONLY BENEFIT THE TAX PAYERS IN THIS STATE.

THAT WE BELIEVE MONTANA'S NATURAL RESOURCES SHOULD BE DEVELOPED FOR THE GOOD OF MONTANANS WITH ADEQUATE CONTROLS TO PROTECT OUR ENVIRONMENT.

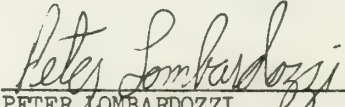
THAT WE BELIEVE A BALANCE MUST BE STRUCK IN THE DEVELOPMENT OF POLLUTION CONTROLS, WHICH WILL FOSTER BOTH ECONOMIC GROWTH AND ENVIRONMENTAL UPGRADING AND THAT WE CAN SUSTAIN INDUSTRIAL DEVELOPMENT AND ENVIRONMENTAL QUALITY TOGETHER BECAUSE OF NEW AND FUTURE TECHNOLOGIES.

IT IS STATISTICAL FACT THAT A POWER SHORTAGE EXISTS IN OUR COUNTRY AND THE MOST FEASIBLE SOLUTION IS TO DEVELOP MONTANA'S ABUNDANCE OF LOW-SULPHUR COAL.

WE ARE CONVINCED MONTANA POWER COMPANY CAN AND WILL MEET TODAY'S REQUIREMENTS FOR ECOLOGICAL BALANCE AND POLLUTION CONTROL AND IN THE FUTURE WILL UPGRADE THESE EFFORTS AS NEW LAWS, STANDARDS, DEVICES AND PRACTICES ARE DEVELOPED.

THEREFORE, THE SOUTHEASTERN MONTANA BUILDING TRADES COUNCIL AND MY OWN LOCAL UNION 532, IBEW, WISHES TO GO ON RECORD AT THIS HEARING OF BEING IN FAVOR OF THE CONSTRUCTION OF THE MONTANA POWER COMPANY COLSTRIP COMPLEX AS BEING IN THE BEST INTERESTS OF THE MAJORITY OF THE PEOPLE IN THIS STATE AND URGE THAT A PERMIT BE GRANTED TO THEM FOR CONSTRUCTION AND INSTALLATION OF THE EQUIPMENT NEEDED FOR THEIR GENERATION FACILITY.

THANK YOU.

  
PETER LOMBARDOZZI  
PRESIDENT, SE MONTANA BLDG TRADES

STATEMENT BEFORE THE DEPARTMENT OF HEALTH  
AND  
ENVIRONMENTAL SCIENCES IN THE STATE OF MONTANA

Miles City, Montana  
January 5, 1973

My name is John W. Ellis, Vice President-Utility Management and Chief Operating Officer of Puget Sound Power & Light Company. As you know, Puget Power and Montana Power Company will jointly own and operate the two-unit coal-fired power plant near Colstrip, which is the subject of this hearing.

My purpose today is not to get into the specific environmental issues, but is more general; to explain to you why Puget is involved in this project -- a project far from our home base in the Puget Sound region, two states away. Intimations have been made that "carpet baggers from Washington" are coming into the state to "exploit and run". The concern of the Montana citizens about their environment and this project is certainly understandable, and a brief explanation of our role is in order.

Although our partnership with Montana for the Colstrip project did not come into being until August of this year, the fact is that Puget and Montana Power Company have been "pooling" resources and facilities for many years. Montana Power Company and five other major investor-owned utilities in Idaho, Washington and Oregon first formed the Northwest Power Pool in 1941 in an effort to coordinate their power generation and transmission facilities. In 1942, a War Production Board order directed all utilities throughout the United States to cooperate with each other to assure carrying the maximum loads during the World War II period. Puget, and all the other major

systems in the area, both public and investor-owned, joined the pool at that time. Following the war, the utilities decided that the gains to be realized through coordinated operation were so great that the pool should be continued. For many years, until the 1960's, pool operation was strictly voluntary, but very successful; and, I might add, some years ahead of other regional groups in the United States.

In September 1964, a formal Coordination Agreement was signed by all the major electric utilities in the Northwest, including Montana Power and Puget. One of the purposes of the agreement was to firm up coordination of reservoir storage water releases during the drawdown season and in turn provide for sharing the costs of upstream reservoirs. The Agreement also required each participating system to establish a firm energy-load-carrying capability and to maintain that capability through power interchanges with other systems.

Currently, all the utilities in the pool area participate in setting up an annual operating program. This program serves as a basic guide for the coordinated operation of all plants in the pool during the year. With the Coordination Agreement, scheduled utilization of storage water from reservoirs of those systems covered by the Agreement is on a firm basis. There are also other areas of coordination which have been achieved on a voluntary basis in the pool over the years. One of these is setting up a coordinated maintenance schedule each year where outages for maintenance are scheduled based upon load requirements and the available surplus in the pool. Another is in the hourly interchange accounting. These transactions between utilities are handled on a scheduled basis

and all schedules are balanced out against the actual interchanges each hour.

The pool utilities cooperate with each other in the operation of reactive equipment to maintain satisfactory voltage levels throughout the transmission system. The utilities have also agreed on procedures to be followed by the entire pool during cases of emergency. This includes a comprehensive load-dropping schedule for use during emergencies. Frequency relays have been installed and their pick-up times coordinated to provide for dropping a substantial amount of the total load, if necessary. The new transmission ties constructed in recent years between the Northwest Power Pool and other operating areas to the south and east further strengthen the benefits to be derived from pool operations.

It has been said, "No man is an island", meaning that no one should exist isolated in his own community. This is especially true for electric utilities and has been borne out very emphatically by the Northeast blackout and similar occurrences in other parts of the country where systems with less interconnections and less coordinated operations than exist in the Northwest have suffered accordingly. The benefits and gains which are realized through coordination and the various phases of operation in the Northwest Power Pool have resulted in substantially less investment costs due to the need for less transmission and generation facilities; increased load-carrying capability; reduced reserves; significant improvement in reliability; and improvement in the quality of electric service.

It should also be pointed out that reduction in the need for generation and transmission facilities directly translates to less

use of our valuable natural resources, including land and fuels. Also, less environmental impacts need to be imposed upon the region.

You can see, then, that in an indirect but very real way, Puget has been doing business in Montana for many years, to the benefit of Montana as well as to Washington. The reverse is also true.

What I have been discussing so far are benefits related in general to the Northwest Power Pool operations. Within the pool, utilities can gain other benefits through additional arrangements between themselves. Examples include individual interchanges, sales, and wheeling agreements. Such has been the case between Montana Power Company and Puget Power for the past several years. Short-term agreements have been executed between Montana Power Company and Puget Power in the last few years to interchange capacity and energy. Progress is being made on a long-term interchange agreement between our respective companies. This will mean significant benefits to the owners and customers of Montana Power Company as well as to owners and customers of Puget.

For instance, at this time the construction of generation at Colstrip appears to be the most feasible solution to energy shortages occurring in the mid-1970's. However, as we move into the 1980's, more nuclear plants will be coming on the line. Long-range plans for the pool show that a number of these nuclear plants will be constructed in Washington State. Our company is currently planning such a plant for operation in 1982. The benefits of interchanges between our two companies will then be more apparent to the customers of Montana Power Company. Montana Power may well obtain shares of these nuclear

plants to carry its increased loads during that period. The point is that a power interchange is a two-way street.

One other fact of electric life should be noted. Neither Puget, nor Montana, nor any other system could be wholly independent, even if it wished. The Pacific Northwest, the Pacific Southwest, and the Idaho-Wyoming-Montana and Utah area are all tied together by major transmission lines of varying capacities. This transmission network essentially describes an oval running along the Pacific coast, then east to Arizona, north through Montana and Idaho, and returning back to the coast. Each system in this network is affected electrically by whatever happens elsewhere on the system. A failure of the Hanford nuclear plant in Washington State, for example, may well cause -- and as a matter of fact, has caused -- the lights to go out in Arizona. In order for this network to be properly balanced, generation must be located strategically, both with respect to load and current flow. Presently the portion of this circle -- which we refer to as "the doughnut" -- which runs through the eastern segment is an area of abnormal current flows by reason of the dissimilarity between load and generation. Difficulties have been experienced in this area -- and these will become even greater unless action is taken. In order for this network to operate more successfully, generation on the eastern side of this doughnut is very desirable.

An additional benefit to Montana Power Company and its customers in my Company's participation in the Colstrip project is a substantial reduction in unit costs by immediate consideration of two units for construction, rather than one unit. The engineer-

contractor for the project, the Bechtel Corporation, has estimated that the savings in a two-unit project, as compared to the one-unit project already decided upon by Montana Power Company solely for its own immediate needs, amounts to about 17 million dollars, a unit cost of \$234 per kilowatt rather than \$289 per kilowatt.

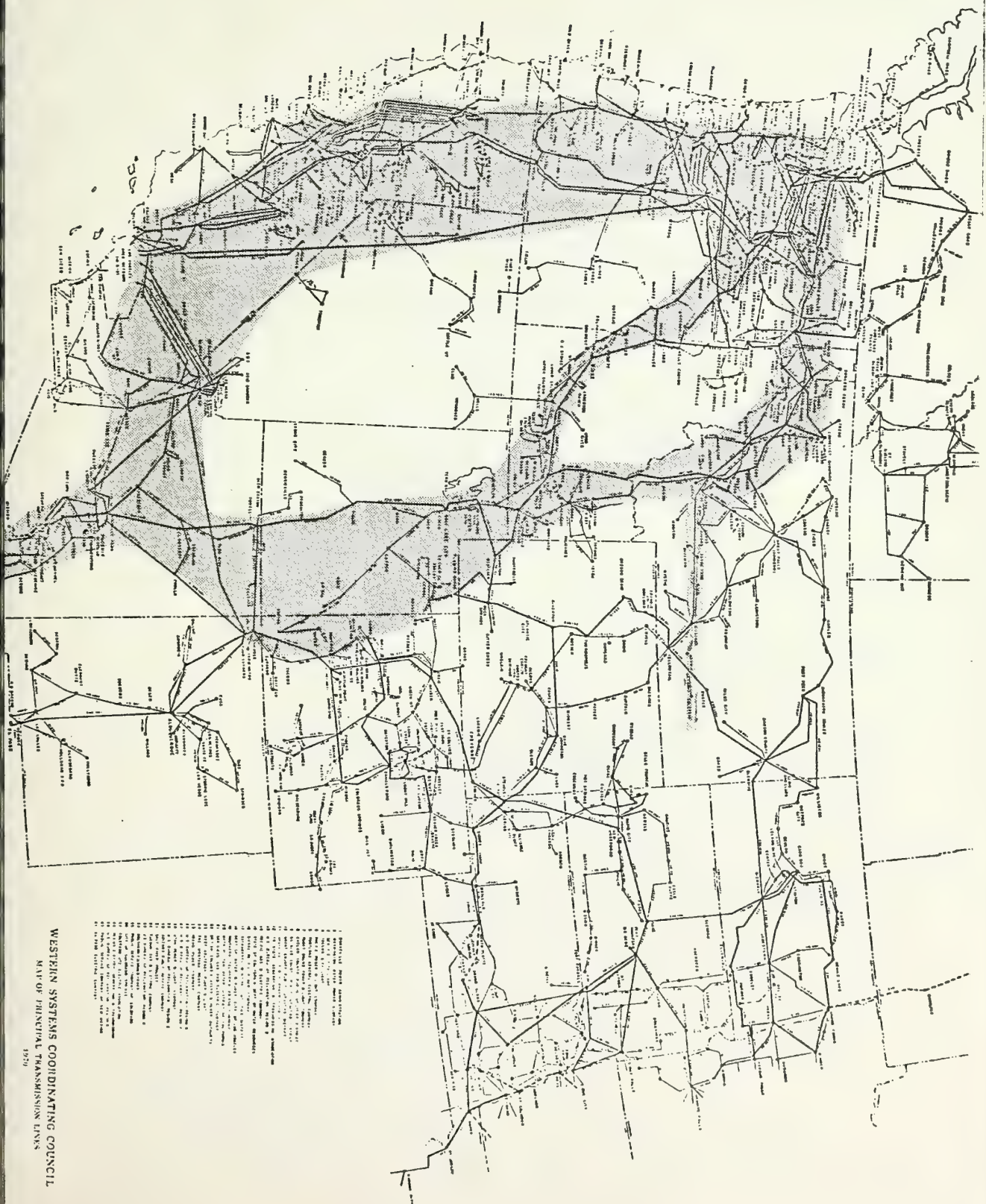
Much has been said -- and will be said -- about the project's impact upon the natural environment. I must say that Puget Power shares the concern of you Montana citizens for environmental values. In the past few years, Puget has developed a regional and even national reputation for being a responsible steward of our natural resources. We have developed numerous company programs relating to undergrounding of distribution lines, development of public recreation areas and trails, aesthetics of lines and facilities, and fish conservation. Ralph Davis, President of Puget Power, was recently named Chairman of the Committee on Environment for the Edison Electric Institute. Our participation in the Colstrip project is absolutely dependent upon its being environmentally sound, as well as economically feasible.

In summary, participation of Puget Power in the Colstrip project does not represent a "cut and run" philosophy, nor is our involvement here something new to the State. Through the Northwest Power Pool and other coordinated activities, through interchange agreements and other arrangements, Puget and Montana have been doing business together for many years with mutual benefit to each company, its customers, and each region. Our company is environmentally responsible. We will insist that all local,

state and federal regulations be met, or bettered by the project. We believe that this project can provide both protection to environmental values and benefit to the economic well-being of your area.

Thank you for the opportunity to appear at this hearing.





WESTERN SYSTEMS COORDINATING COUNCIL  
MAP OF PRINCIPAL TRANSMISSION LINES



ALTERNATIVES IN ENERGY USE

by

Albert G. Melcher, P.E.  
Director of Technical Services

Rocky Mountain Center on Environment  
4260 East Evans Avenue  
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## ALTERNATIVES IN ENERGY USE

### I. Alternatives in Energy Conversion

#### A. Fossil Fuels and Organic Fuels

##### 1. Petroleum.

Uses: electrical generation, water, space and industrial processes, heat, transportation propulsion, lubrication  
Feasibility: presently available; 30-50 year world supply remaining.  
Efficiency of use: electrical generation = 35%; house heat = 80%; transportation = varies (car = 12%); 53.2% of petroleum consumption is for transportation.

##### Environmental Factors:

Production: ecological damages; spillage problems; land use; brine disposal

Shipment: spillage; major spill hazard; consumption of energy with pollution.

Refining: thermal pollution; spent caustic and solid wastes; emissions of  $\text{SO}_2$ , HC,  $\text{NO}_x$  and odors.

Utilization: emissions of  $\text{SO}_2$ ,  $\text{NO}_x$ ,  $\text{CO}_2$ , waste heat, if burned; emissions of  $\text{NO}_x$ , CO, unburned hydrocarbons from internal combustion (which also emits gasoline additives including lead.)

##### 2. Oil Shale

Uses: to petroleum; see I.A.1 above

Feasibility: pilot tests have proven feasibility; could have major production in 5-10 years; economics are present barrier.

Efficiency of use: see oil above.

##### Environmental Factors:

Production: strip mining; land use; disposal of spent shale 50% greater in volume than original shale; leaching of acids and minerals from spent shale; consumption of water (3 bbl water per bbl oil produced), emissions to air of  $\text{SO}_2$ ,  $\text{NO}_x$ , HC, particulates. Problem of environmental quality is partially in vastness of land areas which could be disturbed.

Utilization: see oil

##### 3. Natural Gas

Uses: electrical generation; water and space heating; cooking and other domestic and industrial heat uses.

Feasibility: presently available; 10-20 year world supply available.

Efficiency of use: electrical generation 35%; house heat 80%; water, residential and industrial process heat = unknown. 32.6% used for household and commercial, 46.6% used for industrial, 17.8% used for electrical generation.

Environmental Factors;

Production: land use; water consumption if liquid.

Transportation: pipeline land use and hazard by vehicle, rail.

NO<sub>x</sub> emissions at pipeline compressor stations.

Utilization: thermal pollution, CO<sub>2</sub>, NO<sub>x</sub>, some CO.

Comments: liquid petroleum gas, gases from refining of petroleum, augment supplies of natural gas, have similar uses and effects.

#### 4. Natural Gas by Nuclear Stimulation

Uses: see Natural Gas

Feasibility: in research stage; production requires solution to technological problems and economics; estimated development is hard to forecast, but appears to be moderately remote potential.

Efficiency of use: unknown, as significant quantities of energy (nuclear) are required for production. Use efficiencies as per natural gas.

Environmental Factors:

Production: Land use disruption and damage in blasts; minute amounts of radioactivity in krypton. Potential radioactive pollution of ground water; potential seismic triggering.

Transmission and use: see Natural Gas.

#### 5. Coal-Electrical Generation

Uses: all uses of electricity

Feasibility: presently feasible; 110-150 year world supply of coal remaining if use trend continues. Four to six year lead time in siting, design and construction.

Efficiency of use: about 35% to busbar; maximum potential with improvements is about 39%. Losses in transmission vary, average about 6%.

Environmental Factors:

Mining: Land use (millions of acres), ecological damage, acid runoff, erosion, mine and waste fires, ground subsidence from underground mining.

Transmission to plant: by road, railway, slurry pipeline, with attendant impacts. Slurry pipeline requires water consumption (as water from slurry is highly polluted).

Production: emission of particulates (especially submicron size), SO<sub>2</sub>, NO<sub>x</sub>, CO<sub>2</sub>, trace elements of toxic minerals and radioactivity. Land use, aesthetics, disposal of ash (can be disposed of in strip mine, but ground water may be affected.) cooling water consumption (15 acre-feet per MW), air and water thermal pollution, water pollution from scrubber bleed-off and cooling tower blowdown. Air pollutants are difficult to control. Land use: about 4 million acres now devoted to electrical generation; by 1990, 7 million more acres for 300 new 3,000 MW plants. (Rhode Island = 1 million acres.)

#### 6. Coal Gasification

Uses: High BTU or low BTU gas can be produced, and can substitute for coal in power plants; low BTU gas can substitute for natural gas in many uses, and can be used in electrical power generation. See "Advanced Power Cycle" below.

Feasibility: A prototype is going to be constructed in New Mexico soon. Gasification by fluidized - bed discussion below). There are a number of various processes under development, and large commercial plants can be available by 1977. Current estimates of high BTU gas costs are 4 to 5 times present costs of coal for western power plants. The "Lurgi"

low BTU plant, using a gas turbine for electrical generator drive has been in operation in Europe for 30 years. Low BTU gasification appears competitive with coal if coal-fired plants must spend money on proper environmental controls.

Efficiency of use: not known

Environmental Factors:

Mining of coal

Transmission of coal to plant

Production: Low emissions of  $\text{SO}_2$ ,  $\text{NO}_x$ , particulates. Emission of  $\text{CO}_2$ .  
Ash disposal. Water consumption, land use.

## 7. Advanced Power Cycle (APC)

Description: Basically, APC is a combination of components to achieve higher efficiencies and means of reducing pollution. EPA is studying one APC system consisting of a coal gasifier, a gas-clean-up element, a gas turbine, a boiler and a steam generator. Sulfur is produced as  $\text{H}_2\text{S}$ , which is much easier to remove than  $\text{SO}_2$ . Particulate removal is more effective than for conventional plants. Thermal pollution and  $\text{CO}_2$  will be about half that of conventional plants per KW output.

Uses: base-load electrical power generation.

Feasibility: 500 MW plants by 1980, major use by mid-1980's.

Efficiency: 50% or higher.

Environmental Factors:

Mining of coal: see IA.5 above.

Transmission of coal: see IA.5 above.

Production: emission of  $\text{SO}_2$  (ultimately, about 1/20 of that of conventional plants),  $\text{NO}_x$  (about 1/10 of that of conventional plants), particulates (significantly lower). Land use, disposal of ash, water consumption.

Costs to consumer of APC electricity may be 20% or more lower than conventional plants.

Transmission lines for electricity.

## 8. Advanced Combustion - Submerged Bed

Description - One process being studied by EPA is the use of an iron bath as a combustor for crushed coal. This is similar to the process for making steel. Coal and air are fed into a vat of molten iron. Hot gases released by the combustor heat steam in a boiler for driving a turbine and generator. Slag develops on top of the iron, and ash and sulfur are trapped in the slag which is removed.

Uses: electrical generation

Feasibility: A 100 MW demonstration plant could be on line in 3 years if funds were available. This process could be in major use by about 1980.

Efficiencies of use: not known

Environmental Factors:

Mining of coal, limestone

Transmission of coal to plant

Production: air emissions of  $\text{CO}_2$ ,  $\text{NO}_x$ , unless pure oxygen is used in

combustor instead of air; almost no sulfur or particulate emission. Water for steam production. (Consumes limestone, produces sulfur and some iron.

Transmission lines for electricity.

Cost to consumer probably lower than conventional

#### 9. Advanced Combustion - Fluidized Bed

Description: Air is passed upwards through a bed of granular non-combustible material such as coal ash or lime, causing the granular materials to become suspended. The air serves as combustion air for crushed coal or oil which is air-injected near the base of the bed. Hot gases produce steam in a boiler for turbine and generator drive, to produce electrical power. Advantages are: very high efficiencies of coal energy conversion, potentially high reductions of sulfur,  $\text{NO}_x$  and particulate emissions, lower capital and power costs, use of lower-grade coals, can use flue gases in APC system.

Uses: combustion-boiler for power generation and other industrial processes.

Feasibility: Great Britain is ready to build a 20MW prototype. EPA's goal is to prove the most efficient variations of this process by 1981.

Efficiency: Not known; probably high.

Environmental Factors:

Mining of coal, or production of oil.

Transmission of coal or oil to plant.

Production: small emissions of  $\text{SO}_2$ ,  $\text{NO}_x$ , particulates; emission of  $\text{CO}_2$ . Consumption of water in steam generation. Mining of limestone. Ash disposal.

#### 10. Magnetohydrodynamics (MHD)

Description: A MHD generator converts the kinetic and thermal energy of a moving plasma directly into electrical energy by passing a plasma flow through a strong magnetic field. Gas is superheated ( $4000^\circ\text{F}$ ) until it ionizes and is passed through the magnetic field, causing an electrical flow to occur. There are several concepts for MHD: open cycle plasma, closed cycle plasma and closed cycle liquid metal. In the latter process, plasma is replaced by liquid metal, and electrical currents are generated by its flow in a magnetic field. In the open cycle plasma process, "seeding" with potassium or a similar element is needed to create high conductivity, which is not needed with the closed cycle. The latter could use a nuclear heating source. In the open cycle plasma, MHD generation could "top" a conventional steam-turbine generator, increasing the efficiency. MHD would provide 1/3 of the power; steam would generate 2/3 of the power.

Uses: Electrical power.

Feasibility: R&D needed; estimated development about 1980 to 1985.

Feasible production build-up thereafter unless unforeseen technological problems arise. Russians are constructing 75MW plant with MHD providing 25 MW, steam 50 MW. Generator performance and effective life are obstacles. Flue-gas cleaning in open-cycle

plasma must be improved to recover "seeding" material. Steam MHD may be feasible, using nuclear heating.

Efficiency of use: The MHD portion alone might be 55-60%; additional efficiency achievable if exhaust thermal energy used.

Environmental Factors:

Mining of coal: see IA.5 above.

Transmission to plant: see IA.5 above.

Power generation: unknown.

## 11. Fuel Cells

Description: Similar to space program fuel cells, in which hydrogen and oxygen combine to produce water and electricity, but using natural gas and air to produce water and dc electricity. Small "home units" could be used.

Uses: electrical power, in central or dispersed units

Feasibility: requires hydrocarbon gas (natural, coal, petroleum), hence relies on non-renewable resource. Is presently in research stage; demonstration probable in late 1970's.

Environmental Factors:

Requires gas; can be used in water-short regions. Produces  $\text{CO}_2$  and waste heat (which may be usable).

## 12. Miscellaneous minor organic energy sources

Methane: natural, from sewage treatment, animal manure. Feasible and currently being used for small units. For example, some sewage plants produce more energy than they consume.

Wood: the most ancient fuel. Must be considered non-renewable, as it removes materials from natural cycle of decay and material cycling in ecosystem.

Vegetable and animal oils. (Don't count on whales much longer.)

Refuse: a ton of trash, generated at rate of 5.2 lb/day/person, contains about 10,000,000 BTU's (equivalent to 800 to 900 lb of coal).

## B. Nuclear Fuels

1. Conventional Reactor: water or gas-cooled, Thorium or Uranium 235 fuel, steam generation.

Uses: electrical generation; other uses for "waste" heat.

Feasibility: on line; many water-cooled plants in operation; 1000MW High Temperature Gas Reactor (HTGR) being designed. England produces 12% of electrical power from nuclear plants. Cost to consumer is equal to or less than coal-fired plants, especially if the latter has proper pollution control devices. Eight to ten year lead time in siting, design, construction. Limited supplies of low-cost ores for U235.

Efficiency of use: 32%, with potential "multiple-use" of heat, including cooling water.

Environmental Factors:

Uranium mining; tailing control problems, including entry into watercourses.

Safety in shipment of uranium.

Production: minute amounts of long-lived radioactive tritium and krypton 85; possible severe disaster or minor incident from radioactivity (perhaps due to seismic activity); cooling water requirements about twice that of coal-fired plants, but Public Service of Colorado has 330 MW HTGR with closed-cycle cooling using towers and smaller amounts of make-up water (3%, or 900,000 gal/day/1000 MW).

Waste: processing and disposal of radioactive wastes with thousand-year half-lives, which must be stored in salt beds and which must not be permitted to contaminate underground waters.

"Waste heat" in cooling water can probably be used for agricultural irrigation or other purposes.

Uranium is non-renewable limited resource, with only about 30 years U.S. supply of low-cost U235 ores, not much longer life of world supplies.

Amount of fuel to be handled = 35 tons uranium dioxide vs. 2 million tons of coal for 1,000MW plant.

## 2. Breeder reactors.

Description: Breeder reactors, such as Liquid Metal Fast Breeder Reactor (LMFBR) and Gas-Cooled Fast Breeder Reactor (GCFR), uses plutonium and uranium 238, which is 140 times as plentiful as U235. It produces a net gain of half an atom of fissionable plutonium for every 1.5 atoms of uranium used; hence, it "breeds" new fissionable fuel. Liquid sodium, salt or gas transfers heat for steam generation, which drives turbine and generator.

Uses: see IB.1 above.

Feasibility: Three firms have proposals to AEC for 300 KW test plants.

Russia, England and France are building demonstration plants.

Probably not available for massive use until 1990. The AEC apparently is not interexed in the GCRF, although some scientists favor its development.

Efficiency: not known; not critical except in terms of condensate water.

Environmental effects:

See IB.1 above.

Fuel supply adequate for 20,000 to 60,000 years or more.

## 3. Fusion

Description: Confinement of heavy isotopes of hydrogen (deuterium and/or tritium) at sufficiently high temperature and density will result in the fusion of these isotopes to produce heavier elements and a large amount of energy, which can be converted to electricity. Fuel is abundant in sea water. Higher efficiencies are possible if "topping cycles" (additional energy conversion cycles) are used, and the chance of a nuclear excursion is eliminated. The heavier elements will be helium and hydrogen.

Uses: Heat to generate electrical power.

Feasibility: It will be about five years before researchers will be able to commit themselves to certainty that fusion process is feasible for significant amounts of energy. Much R&D on engineering and science will remain. Fusion appears to be at least 20 to 30 years away.

Environmental Factors:

Less hazard and radioactivity release than conventional fission plant. No mining or waste disposal

C. Natural non-depletable sources.

1. Geothermal

Description: In certain regions, heat from the magma of the earth's mantle, under the cool outside crust, is closer to the earth's surface and in sufficient quantities to heat underground water in porous and permeable rock. This heating is often great enough to produce steam. Hot springs are natural examples of geothermal water flows. By ordinary well drilling, geothermal steam or hot water can be brought to the surface. It can be used to drive turbines for electrical generation or for residential or industrial heat.

Uses: electrical generation, heat for hot water.

Feasibility: Immediate. One plant in California has 82MW of electrical generation on line, 330 MW more under construction, and 2 to 5 thousand MW potential in the geothermal field. Mexico, Japan, Hungary, USSR, Iceland and New Zealand are all producing electricity from geothermal sources, as well as producing hot water. Estimates of available power range from 30,000KW to 100,000MW (present installed generating capacity in U.S. is 300,000MW). Problems exist in exploration, and power must be transmitted to load centers. Potential geothermal fields about 1/3 to 1/2 of the West. Costs of electricity to customer might be 2/3 that of coal-fired plants. Probably 4-5 year lead time from start to on-line of plant.

Efficiencies: vary; moderately low to medium.

Environmental Factors:

Production: wells, land use. Emissions of small amounts of methane, hydrogen sulfide, (which is easily controlled).

Transmission: power lines.

Comment: Nuclear detonations to create subsurface cavities at great depths for geothermal reservoirs is being considered by the AEC. Environmental effects are unknown, but will involve some radioactivity.

2. Hydroelectric Power, including Pumped Storage:

Uses: generation of electrical power, especially good for peak power.

Feasibility: In use. About 35% of world potential, two-thirds of U.S. potential has been developed; accounts for 3.9% of U.S. energy conversion. Lead time in dam planning and construction is usually at least a decade. Pumped storage requires two reservoirs. During off-peak hours, electricity is used (from another source) with reversed turbines to pump water from lower to higher reservoir, where it can be used to generate power during peak periods. Economics limit its use.

Efficiency: high

Environmental Factors:

Damming of rivers and change of flow. Unfortunately, the same physiographic features which make good dam sites also make for scenic beauty and wilderness qualities. Dams cause thermal changes, evaporative losses and salinity concentration increases, supersaturation of nitrogen in water, changed land use, inundation of

wildlife habitat, etc., etc. Pumped storage is a fairly good energy storage system.

### 3. Solar Energy

Description: several different means of capturing and using the sun's heat radiations for energy are in use or are possible. One type uses cells on individual houses or in small units to heat hot water, which can be stored. A proposed massive system would involve a 75 mile square, with solar heat being absorbed, stored in liquid metal, used to generate 1,000,000 MW of electrical power. A third possible method is a synchronous-orbiting satellite with photovoltaic cells of 25 square miles, with microwave energy relay to earth. A fourth method uses photovoltaic cells at the earth's surface. Solar heat radiation induces an electrical flow in photovoltaic cells. This is used in the space program, but presently is extremely expensive. A fifth proposal is a large solar concentrator-converter.

Feasibility: Presently, economics hinder wider use. "Primitive" technology is available. A five-to-ten year lead time for large demonstration plants seems reasonable.

Efficiency: 10%, with 20% as a goal.

Environmental Factors:

Land use: large areas of land will be required for "heat farms."

Transmission: by wires;

Probably the "cleanest" and least depletable energy conversion process possible.

### 4. Ocean Power.

Description: Tidal flows are presently used to drive turbines and generators in one large estuary in France. Floating wave-power plants are a concept.

Uses: generation of electrical power.

Feasibility: Tidal-flow turbines are in use, but economics of construction is unfavorable.

Efficiencies: not known.

Environmental Factors:

Not known; some effect on estuaries from tidal plants, probably highly disruptive of natural estuarine ecosystem.

Aesthetics.

### 5. Wind.

Description: remember the windmill? Unfortunately, the wind doesn't blow all of the time. Could be used with (improved) storage batteries, for small scale electrical power.

Uses: Local electrical and mechanical power.

Feasibility: Limited, but available now. Economics not known.

Environmental Factors:

Can windmills be as ugly as transmission lines? (See Holland.)

## 6. Hydrogen

Description: Liquid hydrogen is used as a fuel in rockets, and has tremendous energy potential. Potentials, feasibility, uses and environmental factors have not been adequately studied.

## II. Alternatives in Transmission and Storage

Discussion: The mode of moving energy from source to conversion point to point of use, and combinations of modes, give a range of alternatives with varying environmental impacts. Decisions are usually based almost completely on economics, which is affected by the technological state-of-the-art. Better decisions will consider environmental factors to develop a better mix of modes and siting. Also, energy losses in transportation are considered in economic terms; environmental factors of losses should be considered, and to the maximum extent, efficiency (or minimization of energy losses) should be a paramount determinant as well as direct costs of losses.

Environmental factors include spillage, safety hazard, aesthetics, effect on biota, land use, air and water pollutants and thermal changes, effect on recreation and cultural values, potential hazard to service continuity, and other factors.

Storage is a factor in the time-quantity aspects of energy movement. Pumped hydroelectric power has been mentioned as one form of energy storage. Electric batteries are another. Storage is important also in enabling best utilization of "clean" conversion modes, some of which rely on intermittent natural process, or which are not suited to peaking problems without storage.

Following is a brief outline of storage and transmission modes, with limited discussion of certain considerations.

### A. Storage

1. Hydro-electric. See pumped storage in Section I.
2. Batteries: The lead-acid storage battery used in automobiles is an example. R&D is being performed to increase storage capabilities. Problems exist in amount of energy stored and release rates, charging rates, cost, and safety, especially for use in cars. Some of the potential battery types operate at fairly high temperatures, such as lithium-chlorine battery at about 600°. Other batteries are nickel-cadmium, nickel-zinc, silver-zinc, organic-electrolyte, zinc-air, and sodium-sulfur. Battery efficiency is 80% or higher, so there are energy losses in storage. World supplies of some of the metals are very limited.
3. Heat storage: hot water, molten metals, and solid materials can be used. At present, low use factors of capital investments in heat storage make them uneconomical. This does not imply that there is no future for heat storage; limited applications should be feasible if the storage is integrated into a production-transmission-storage system. Molten metal takes advantage of the latent heat of liquifaction; to liquify a material requires an input of heat with no change in temperature; this heat is released when the material solidifies.

4. Mechanical storage: flywheels can be used to store energy in stationary and mobile situations. R&D is needed, but a good potential exists.

#### B. Transmission

1. Obviously, energy is transmitted in gas, liquid and solid form by land and water. Ships, barges, trains, trucks, pipelines are all used. The decisions are usually based on economics and on physiography (i.e., oceanic shipment means ships, not trains or pipelines).
2. Electrical energy is transmitted by wire. Current technology limits AC voltages to 345 KV. Future voltages may be as high as 1300 KV. Direct-current transmission is economically competitive in high voltages at distances of 400 miles or more; capital investment in conversion stations is the primary factor in this. There are still problems in reliability of high-voltage DC transmission, and R&D is needed.

Greater energy transmission per corridor is possible. For example, per square foot of corridor space:

345 KV AC permits 47 KW/ft<sup>2</sup>  
735 KV AC permits 61 KW/ft<sup>2</sup>  
1300 KV AC permits 94 to 400 KW/ft<sup>2</sup>, eventually.

#### Comparing AC and DC for equal Right-of-Way:

AC		DC	
KV	MW	KV	MW
230	240		
345	580	300	900
500	1,280	500	2,500
765	2,700	700	4,500
1,300	6,500	1,000	8,000

Undergrounding of cables is always of interest to the public for environmental interest. Currently, total capital and M&O costs are 5 to 15 times higher for high-voltage underground transmission. Research is being done in insulation (including gas insulation), cryogenics for very high conductivity, and other factors. There are a number of technical problems.

Grids of transmission systems transfer power, and are especially important in meeting peaking demands. Improved grids can reduce the amount of facilities for production of energy by providing better utilization of facilities. It appears desirable to delay any massive grid development until additional R&D is accomplished, so that the future grid can use advances in technology. Perhaps 6 years of R&D and 5 years of grid development might be reasonable.

"Utilidors" should be developed in urban and non-urban situations. The "utilidor" is a utility corridor, in which transportation, communications, energy, gas, water, wastes and other materials are moved. Space and land use utilization, aesthetics, cost, and potential for waste heat recapture are justifications for utilidors. Europeans are way ahead of this country in developing utilidors.

3. General comment: at present, it is just as economical to ship coal as it is to transmit electricity from power plants. Energy efficiency appears greater for bulk coal shipment (97% by train vs. 90% for electricity transmission); i.e., energy losses are higher for mine-mouth generation and wire transmission.

Environmental problems exist in any form of energy shipment or transmission. Perhaps the greatest concern at present is associated with petroleum production and shipment, with oil spillage. Both continuous small amounts (0.1% of shipped oil) and potential supertanker disasters are involved. In the Atlantic, Jacques Cousteau figures that the damage to the ocean is already 30% to 50%.

Proper planning, design, location and controls are imperative to minimize environmental damage.

### III. Alternatives in Consumption

Following are a few general comments.

#### A. Efficiency in Consumption.

1. Transportation. Transportation consumes about 30% of our energy in direct use, and about 10% more in indirect use (refining, asphalt, production of transportation equipment, etc.).

In direct consumption, efficiency in terms of BTU's per passenger miles for various modes is as follows:

Fast train	980
Subway train	1700
Large bus	1000
Car (1.2 people)	7300
747 Jet	5900
SST	9500

In cargo, large pipelines and supertankers deliver 800-1000 ton-miles per gallon, freight trains 100-300, trucks less than 100. In terms of total consumption, automobiles account for the great majority of energy consumption. Efficiency of energy conversion for the car is about 12%; electrical cars could achieve a 20% efficiency from energy source to use.

It is readily apparent that mass transit, smaller and more efficient cars, increased pedestrian and bicycle use, and a number of steps can and must be taken to change transportation efficiencies and reduce consumption. For example, the "Single Urban Fund" proposed by the Secretary of Transportation would permit the use of gasoline taxes for mass transit development. Unfortunately, the proposed \$1 billion per year is 1/4 of what is needed, and as constituted, only the very large cities would benefit.

2. Consumption in residential-industrial uses: There are considerable opportunities in better building design to reduce heating loads (by 20% with better insulation), avoid air-conditioning, and improve the use of natural light.

Efficiencies exist in every aspect of consumption, including refrigeration, industrial production, and other uses. The problem must be attacked through R&D, building codes, better engineering, and other means.

3. "Waste" heat was discussed in conversion alternatives; opportunities exist in consumption also, but will not be discussed in detail herein.

#### B. Controls of Consumption

1. Rationing-electricity, gasoline, gas.
2. Education of consumers
3. Pricing: basically, all costs should be internalized. New users bear entire cost of new energy. Surcharges in peak months. Inverse pricing (the rate increases with use). Elimination of all subsidies such as subsidized water, depletion allowances. "luxury" taxes: air conditioning, non-necessary uses. Pollution taxes to producers (to internalize costs).
4. Utility companies change profit and compensation system (from return on investment). Restrict advertising.
5. Interruptible service to industry to reduce peak loads.

### IV. Alternatives in Land Use

#### A. Generation location.

Past practice has located generation facilities near load centers. Cheaper high voltage transmission and increasing pollution control costs for load center plants have led to the mine-mouth location in the case of coal. There are better alternatives and combinations of components of the system than those proposed in the Southwest and North Central power studies.

Generation of power and heat can be at:

- Load Center .
- Central plant
- Individual Units
- Energy source
- Anywhere in between (limited primarily by cooling water; this limit can be reduced if flow-through water cooling is not used).

New thinking can be utilized. Cooling water could be irrigation water, used and returned to irrigation. Industrial cities should eventually be developed to use every bit of presently wasted heat and material, and should be located at power plant sites. These need not be at energy resource locations, because coal or other energy can be shipped to the plants as cheaply as power can be transmitted by wire.

Transmission systems should be based on land use factors, and should use the utilidor concept.

#### B. Resource Development.

There are some commercial resources which should never be touched because very high environmental values will be destroyed. Furthermore, there are priorities in developing other resources. Those which conflict with the natural high-value areas should at least be left as options for future generations. Those resources which force the development of other resources, such as water, new roads, new towns, should be low priority. Strippable coal should not automatically

be given high priority, but should be restricted by governmental action and released for use by government, in the general welfare. Complete land reclamation must be practiced.

### Comments

1. "Land use" in environmental factors has a number of ramifications. Loss of arable land, vegetation, wildlife habitat, open space are involved. Impacts on watershed and ground and surface water may be involved. Aesthetics is always affected. In some cases, such as land use for oil refineries, economics and technological factors cause especially unpropitious land uses, such as refineries in estuarine areas or near deep-water tanker unloading facilities.
2. Water consumption has attendant ecological damages: reduced stream flows; increased concentration of dissolved minerals; dams and reservoirs in many cases; thermal changes to streams, and others. Pollution can be reduced by evaporation of water from blowdown, scrubbers, etc., but this increases consumption and harms river flows, salinity, etc. Pollution could be reduced by tertiary treatment with less consumption.
3. Alternative uses of resources has not been emphasized in this treatment. For example, petroleum for lubrication is presently essential for industry, transportation and household use. Lubrication presently accounts for 0.8% of net energy input in U.S. Vegetable oils could substitute in the future, but the amount of land required and inputs of water, fertilizers and production facilities could be a significant problem.

Coal is a potential food source, as an alternate use. Water as many alternate and multiple uses, including cultural and aesthetic uses, but it is a source of energy and is necessary in energy conversion.

4. Other resources and capital involved in energy production/transmission have not been portrayed. A power plant requires cement, steel, copper and other metals which are increasingly scarce or of lower grade ores, etc. All of these materials require natural resources and energy in their production and fabrication, with attendant environmental effects.
5. Pollution control feasibility and cost is a major aspect of alternatives, and this has not been displayed in the itemization above. In general, particulate emissions,  $\text{SO}_2$ ,  $\text{NO}_x$  and CO are difficult and expensive to control, and synergism is a problem in both control and effects. In coal-fired power plants, for example, electrostatic precipitator removal of particulates is more efficient with high-sulphur coal. Carbon monoxide control in internal combustion engines and  $\text{NO}_x$  controls are inverse, if control is attempted through compression ratio and combustion control.

In effects,  $\text{SO}_2$ , particulates and  $\text{NO}_x$  all act synergistically on biota and on visibility.

6. Base load and peaking load generation of electricity are separable problems to an extent. Certain technologies are well suited to continuous base load power generation but not as well suited to peak load generation.
7. Research and development funding and time schedules are a major point of contention. It must be recognized that adequate funding can only compress

an R&D timetable to a certain point. However, examples in foreign countries indicate that successes are possible and that America lags badly in many respects. This is partially due to U.S. emphasis on military and space research, partially due to reliance on private industrial research. It is obvious that U.S. R&D investment must be greatly accelerated. Electric power companies recommend \$10.9 billion on R&D on present methods of generation ("because of heavy industry-wide investment in present day equipment") in the next 29 years, and only \$731 million for new non-nuclear technologies (Solar, MHD fuel cell, etc.) in about the same period. Nuclear R&D funds are proposed at \$8.4 billion, over 29 years, with major expenditures starting in 1980. It is highly probable that the public will be better served by R&D which does not perpetuate present generation technologies but which brings new technologies on line as soon as possible. These power companies recommend no Federal investment in geothermal energy, for example. Similarly, power companies recommend major R&D on present methods, minimal funding for new technologies (such as very high voltage AC, DC, undergrounding, etc.).

8. Waste products can be reduced and power costs lowered by efforts to use wastes as by-products. For example, some minerals are recoverable from ash, and ash itself can be used in concrete for and other purposes. Economics presently impedes progress, but more research and positive programming is needed. Siting is important. For example, plant location in remote areas hurts the economics of ash or sulfur use because of shipping costs.



IN REPLY REFER TO:  
Administration

United States Department of the Interior  
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LAME DEER, MONTANA 59043

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FEB 22 1973

ENVIRONMENTAL  
DIVISION

February 13, 1973

Mr. Dan Vichorek  
State Department of Health  
Coswell Building  
Helena, Montana 59601

Dear Mr. Vichorek:

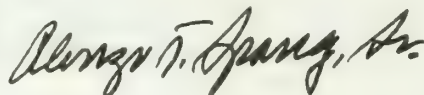
Per our telephone conversation relative to the Colstrip Power Plant, I have discussed this with Mr. Allen Rowland, Tribal President. He is planning to share his thoughts also. I submit the following comments on the subject:

1. The Northern Cheyenne Tribe is definitely concerned over the proposed construction of the power plant at Colstrip. They see this as having a decided negative effect upon the environment of the reservation.
2. There will be a "splash over" effect of influx of people into the Colstrip area. Already, with Peabody Coal and Western Energy mining operations, the influx of people is felt at Lame Deer. A number of employees of these companies do reside on the reservation--these are employees who are not members of the Tribe and who are non-Indian. With the construction of the power plant in full operation, we can anticipate greater numbers desiring to reside here.
3. The power plant will create a pollution problem as it will release fly-ash as well as other emissions which will be carried to the reservation. The normal wind direction is from Colstrip to the south and the reservation is located in that general area.
4. The Tribe is concerned about the effects of pollution on not only natural resources, i.e. timber, water, etc., but upon humans. Also, the effects on wildlife and other game will be negative. This is of great concern to the Tribe.
5. The Tribe anticipates heavy use of its recreation areas by non-Indians. The Tribe is not prepared to handle this degree of influx. Also, this could create some very real jurisdictional and legal problems.
6. Certainly, with more people moving into the area, traffic by vehicular means will be greatly increased. This will create problems for the reservation and its people.


7. Finally, the Tribe is concerned about the loosely and nebulously worded draft impact statement that has been circulated. There are too many unanswered questions contained within that document; insufficient or inadequate responses to questions raised by the writers of that document, etc. It is hoped that a more complete and comprehensive study be made before the permit to construct is issued.

In conclusion, the Tribe is concerned that little or no attention has been given to their views on the proposed plant. The Tribal Council, as the highest governing body of the reservation had not been contacted prior to your telephone call.

Sincerely yours,

A handwritten signature in cursive script, reading "Alonzo T. Spang, Sr.".

Dr. Alonzo T. Spang, Sr.  
Superintendent




STATE OF MONTANA

# Environmental Quality Council

FLETCHER NEWBY  
EXECUTIVE DIRECTOR

CAPITOL STATION, HELENA, MT. 59601



GOV. FORREST ANDERSON  
OR DESIGNATED REPRESENTATIVE  
MR. GARY ACK

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MR. MICHAEL J. MC KEON

January 3, 1973

Dr. John S. Anderson, Director  
Department of Health and  
Environmental Sciences  
Helena, Montana

Attention: Mr. Donald Holtz

Dear Dr. Anderson:

The draft environmental impact statement and draft supplement on the proposed Montana Power Company electrical generating plant at Colstrip has been reviewed by the EQC staff, prompting the ensuing comments.

Page 2--paragraph 2. The pipeline diameter and maximum water diversion figures presented here, in the supplement, and page iv are significantly smaller than those in Montana Power Company's Notice of Appropriation<sup>3</sup> (22"-26" vs. 60" and 8,000 gallons per minute vs. 112,200 gallons per minute). A more definite commitment as to size of pipeline is needed to assess the possible future environmental impact on the Yellowstone River due to water withdrawal. (See comments on water quality impact).

Page 4--paragraph 1. A recent environmental assessment on a proposed mobile home park at Colstrip, prepared by the Environmental Services Bureau of the Department of Health, indicates that at least a portion of the 800-900 man construction work force will live in the Colstrip area. The assessment states that "The immediate population (of the trailer court) is likely to consist of temporary area residents whose interest is construction employment. Too often this transiency precludes care of housing and premises and little aesthetic improvement is undertaken."

The assessment further states that "...the immediate effect (of the total complex) is likely to be a tendency toward a boomtown environment, especially during the construction phase. Unless carefully controlled, spin-off service type business could develop indiscriminately with an eye to operation during the boom phase only. This practice leads to hastily, improperly and cheaply constructed establishments which are abandoned when their profits decline."

Dr. John S. Anderson  
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January 3, 1973

There was apparently little or no coordination between the Environmental Services Bureau and the Air Quality Bureau in assessing the impact accruing from the influx of construction workers. Furthermore, neither Environmental Services' assessment nor Air Quality's impact statement adequately discussed the full range of ramifications possible, including social and economic, due to the total temporary construction work force.

Page 8--paragraphs 3 and 4. Perhaps more pertinent to local ambient air quality than a description of a modified continental climate would be a discussion of local meteorological conditions, including prevailing wind direction and velocity, inversion strength and frequency, the relationship between seasonal weather patterns and contaminant concentration levels, and the probable behavior of plumes with respect to local topography. It is possible much of this information is now available from the meteorological assessment being conducted for the applicant by Montana State University.

Page 12--paragraph 1. Some discussion should be presented here on the adequacy of the diffusion model and why this model was chosen over others that may be available. Has this model proven accurate in past applications?

Page 19--paragraph 3. The statement that uranium and thorium will be removed from the effluent gases suggests that these elements will be present in the fly ash. If so, in what concentrations are they likely to occur? Also, has uranium and thorium removal from effluent gases been demonstrated in existing installations?

Pages 25,26--parts D.1.b.,c. It is reasonable to assume that the preponderance of the water soluble components of the ash will be extracted and concentrated in the water of the ash ponds before the ash is removed to be buried in the mines. It is therefore conceivable that groundwater contamination could result from percolation of highly charged mineral water into the subsurface reservoir. Is such contamination likely? If so, what provisions have been made for sealing the bottom of the reservoir? If contamination is not likely, mention should be made of this fact.

Page 29--paragraph 4. The changes in water quantity due to diversion from the Yellowstone River can be quantified, and changes in water quality due to this diversion can be predicted, at least intuitively as to the types of changes to be expected. The degree to which these changes would take place is in the realm of speculation.

According to statistics supplied by MPC the proposed plant would consume 8,000 gallons per minute or 17.8 cubic feet per second (cfs). Records from the Rosebud County clerk and recorder's office indicate that the total MPC appropriation from the Yellowstone River is 250 cfs. 3

These two figures, 17.8 cfs and 250 cfs, can be compared with selected Yellowstone River discharge figures to yield the proportion or percentage of river water diverted from which estimates of impact on water quality may be approximated. The following selected discharge figures were measured by the U.S.G.S. at station 3090 on the Yellowstone River at Miles City. 4

Dr. John S. Anderson  
page three  
January 3, 1973

1. 996 cfs (December 14, 1932). Minimum discharge for period of record.  
17.8 cfs = 1.8%  
250 cfs = 25%
2. 1400 cfs (May, 1961). Minimum discharge for water year 1961.  
17.8 cfs = 1.3%  
250 cfs = 18%
3. 2290 cfs (January 7, 1970). Minimum discharge for water year 1970.  
17.8 cfs = 0.8%  
250 cfs = 11%
4. 11140 cfs. Average discharge for 43 years of record.  
17.8 cfs = 0.2%  
250 cfs = 2.2%

From the foregoing it is clear that water diverted for and consumed by the proposed plant (17.8 cfs) would be inconsequential in terms of the total flow of the Yellowstone past Miles City, even at minimum discharge levels. The additive effect of several more plants drawing water from the same source may be considerable, however.

Assuming utilization of the total appropriation of 250 cfs, proportionate use of Yellowstone River water would range from 11% to 25% at minimum discharge levels and 2.2% of the 43-year average discharge. For those who would contend that this is an unrealistic figure because appropriations are usually far above what is actually diverted and used, the Appraisal Report on Montana-Wyoming Aqueducts<sup>2</sup> lists approximately 2,350 cfs (1,700,000 acre-feet per year) of Yellowstone River water subject to development as industrial water supplies and a recent newspaper editorial<sup>1</sup> written by a Bureau of Reclamation official indicates that in normal years the flow of the Yellowstone would be reduced one-third and in a dry year the flow would be reduced about one-half as a result of water diversion for industrial use.

The diversion of water of the magnitude discussed in the paragraph above would have effects on the water quality of the Yellowstone River in the following areas:

1. Temperature. Loss of water volume and buffering capacity would result in more erratic temperature fluctuations, higher temperature maxima and more prolonged periods of freezing, thus affecting:
  - a. life histories of fish, invertebrates and aquatic plants.
  - b. growth and reproductive rates of preferred and undesirable fish species, possibly giving the latter a competitive advantage and resulting in changes in
  - c. relative abundance of preferred and undesirable fish species.
  - d. growth rates of aquatic plants, including algae; possibly enhancing seasonal production resulting in nuisance blooms and taste and odor problems.

- e. diversity of the aquatic community.
2. Concentration of Pollutants. Most water quality management plans are based on the dilution effect afforded by the receiving waters. Once a substantial volume of dilution water is removed polluters may find themselves in a position of noncompliance with existing water quality criteria. Parameters, the concentrations or levels of which may be affected, include:
- a. coliforms.
  - b. biochemical oxygen demand (BOD) and dissolved oxygen.
  - c. pH
  - d. turbidity.
  - e. temperature.
  - f. residues.
  - g. sediment or settleable solids.
  - h. toxic substances (pesticides and heavy metals).

In the extreme case, one or any number of these factors may increase (or decrease) in value or concentration to the point where the tolerance level of fish and bottom organisms is exceeded and community diversity is thereby reduced,

3. Concentration of Nutrients. Nutrients, particularly phosphorus, nitrogen and carbon, are critical to growth of algae and other plants which form the base of the aquatic food chain. Only slight increases in the usable concentrations of these three strategic elements, alone or in combination, are often enough to trigger massive algal growths or blooms which could degrade the water aesthetically by causing taste and odor problems and visual unsightliness. The Yellowstone River, however, is not subject to this type of problem except where it or its confluent the Missouri may be impounded.

These are three areas where water quality would be affected by diversion away from the river. These are merely the types of problems that may arise; statements on their extent would be speculation at this time. The severity of the impact would be determined by the magnitude and timing of the withdrawal. Critical parameters should be monitored over a period of years to detect undesirable changes as development progresses and more water is appropriated, withdrawn and consumed.

Page 37--Section VI. Possibly here or under the description of the proposed action should be presented some information attempting to justify the need for this plant in this location. The applicant should be able to substantiate Montana energy needs by supplying information on the following evaluative criteria: (1) growth in demand and projections of need; (2) socially beneficial uses of the output of this facility, including its uses to protect or enhance environmental quality; and (3) conservation activities which could reduce the need for more power.

Also desirable would be an informative discussion on why the plant is being located here rather than at the load center.

Dr. John S. Anderson  
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Page 45--list of contributors. Although an impressive list of credentials is presented here, the Department of Health has other specialists, such as water pollution and noise specialists, who could have added substantially to the impact analysis. Also, the impact analysis can hardly be considered complete without the input of either a social scientist or a life scientist.

Supplement--Dry Cooling Towers. Additional information on the costs of wet versus dry cooling might be obtained from a recent article based on work conducted out of the EPA Northwest Water Laboratory, Corvallis, Oregon.<sup>5</sup> This article concludes that "...whenever the competitive demands for other water uses put a high enough cost on its use for cooling, the dry system may well become an economically attractive alternative to evaporating cooling systems."

We hope these comments will be helpful in constructing your final impact statement and making your decision on the Colstrip power plant. Thank you for your efforts toward compliance with MEPA and the EQC guidelines.

Sincerely yours,

FLETCHER E. NEWBY  
Executive Director

By *Loren L. Bahl*  
Loren L. Bahl, Ph.D.  
Staff Ecologist

and *Thomas J. Gill*  
Thomas J. Gill  
Research Assistant

cc: Dan Vichorek  
enclosure - Fletcher E. Newby testimony



## REFERENCES

1. Aldrich, Harold E. 1972. Guest editorial on power production and energy and water requirements in the Fort Union region. Billings Gazette, December 10.
2. Bureau of Reclamation, U.S.D.I. 1972. Appraisal report on Montana-Wyoming Aqueducts. April.
3. Culver, F.D. 1972. Memorandum to Fletcher Newby on MPC water appropriation from the Yellowstone River for Colstrip area power plants. November 9.
4. Geological Survey, U.S.D.I. 1970. Water resources data for Montana. Part 1. Surface water records.
5. Shirazi, M.A. 1972. Dry cooling towers for steam electric power plants in arid regions. Water Research 6: 1309-1319.



STATEMENT PRESENTED AT THE PUBLIC HEARING ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT ON THE PROPOSED COAL-FIRED ELECTRICAL GENERATION FACILITY TO BE CONSTRUCTED AT COLSTRIP, MONTANA BY MONTANA POWER COMPANY, JANUARY 5, 1973.

I AM FLETCHER NEWBY, DIRECTOR OF THE ENVIRONMENTAL QUALITY COUNCIL, ESTABLISHED BY THE MONTANA ENVIRONMENTAL POLICY ACT (MEPA) OF 1971.

THE ENVIRONMENTAL QUALITY COUNCIL WAS CREATED BY THE LEGISLATURE TO PROVIDE A POLICY OVERVIEW OF STATE AGENCY ACTIONS WITH ENVIRONMENTAL CONSEQUENCES AND TO ADMINISTER THE ENVIRONMENTAL IMPACT STATEMENT PROCESS. IN ADDITION, THE COUNCIL HAS BEEN INSTRUCTED BY THE ACT "TO REVIEW AND APPRAISE THE VARIOUS PROGRAMS AND ACTIVITIES OF STATE AGENCIES" IN THE LIGHT OF THE ENVIRONMENTAL POLICY TO DETERMINE THE EXTENT TO WHICH SUCH PROGRAMS AND ACTIVITIES ARE CONTRIBUTING TO THE ACHIEVEMENT OF THIS POLICY. IT IS IN THIS CONTEXT THAT THE COUNCIL IS INTENSELY INTERESTED IN THE DECISIONS AND ACTIONS OF THE BOARD AND THE DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES AFFECTING ENVIRONMENTAL QUALITY.

MEPA IMPOSES A LEGAL DUTY ON STATE AGENCIES TO CONSIDER ENVIRONMENTAL VALUES IN THEIR DECISION-MAKING PROCESSES. AGENCIES WHOSE MANDATES PREVIOUSLY DIRECTED THEIR ATTENTION ONLY TO CERTAIN FACETS OF THE ENVIRONMENT NOW HAVE A RESPONSIBILITY AS BROAD AS THE ENVIRONMENTAL POLICY DECLARED IN MEPA, WHERE AN AGENCY PREVIOUSLY LOOKED AT ONLY A LIMITED ASPECT OF PRIVATE ACTIVITIES UNDER ITS REGULATION, MEPA FORCES IT TO BROADEN ITS CONCERNS

SUBSTANTIALLY. AN AGENCY MUST CONSIDER, AND AS APPROPRIATE, ACT TO MINIMIZE THE ADVERSE ENVIRONMENTAL EFFECTS THAT CAN BE EXPECTED FROM THE ACTIVITY SUBJECT TO ITS REGULATORY ACTION.

MEPA IS CLOSELY MODELLED UPON ITS FEDERAL PREDECESSOR THE NATIONAL ENVIRONMENTAL POLICY ACT (NEPA). FOR THIS REASON WE REGARD THE PRECEDENTS ESTABLISHED BY FEDERAL CASE LAW AS INSTRUCTIVE GUIDANCE FOR OUR OPERATIONS. IN THIS REGARD OUR TESTIMONY DRAWN FROM THIS BACKGROUND AND PRESENTED TODAY WILL PRIMARILY CONCERN PROCEDURAL MATTERS AS CONTRASTED WITH TECHNICAL COMMENTS, WHICH WE ARE SUBMITTING SEPARATELY. WE ARE AWARE THAT EXTENSIVE TECHNICAL COMMENT ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT HAS BEEN RECEIVED BY THE DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES.

THE TWO PRIMARY PURPOSES OF AN ENVIRONMENTAL IMPACT STATEMENT ARE (1) TO COMPEL THE AGENCY TO CONSIDER THE ENVIRONMENTAL CONSEQUENCES OF ITS PROPOSED ACTION AND (2) THE ACCOMPLISHMENT OF FULL DISCLOSURE. THE ENVIRONMENTAL IMPACT STATEMENT IS NOT ONLY FOR USE BY DECISION MAKERS, IN THIS CASE THE BOARD AND THE DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES, BUT ALSO MUST PROVIDE A BASIS FOR MEANINGFULLY ALLOWING THOSE WHO ARE REMOVED FROM THE DECISION-MAKING PROCESS TO EVALUATE AND BALANCE THE FACTORS ON THEIR OWN. THE STATEMENT MUST, AT A MINIMUM, CONTAIN INFORMATION WHICH WILL ALERT THE PUBLIC TO ALL KNOWN POSSIBLE ENVIRONMENTAL CONSEQUENCES. BECAUSE THE DRAFT SERVES AS A PRIMARY MEANS OF INFORMING OTHERS ABOUT THE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION AND OF POSSIBLE ALTERNATIVE ACTIONS, IT SHOULD EMBODY A THOROUGH AIRING OF EACH OF THE POINTS SPECIFIED IN THE STATUTORY LANGUAGE OF MEPA. BY THE TIME IT CIRCULATES A DRAFT THE INITIATING AGENCY SHOULD

HAVE FULLY EXPLORED THOSE POINTS WITH HELP FROM OTHER SOURCES WHEN NECESSARY, RATHER THAN LEAVING PARTS OF THE ANALYSIS TO BE FURNISHED BY SOURCES OF COMMENTS.

WE BELIEVE THE DEFICIENCIES TO BE NOTED IN THE DRAFT STATEMENT ARE PRIMARILY THE RESULT OF ALLOWING INSUFFICIENT TIME FOR PREPARATION OF THE DRAFT AND FAILURE TO COMPLY WITH SECTION 69-6504(B)(1) OF MEPA WHICH DIRECTS AGENCIES TO UTILIZE A SYSTEMATIC INTERDISCIPLINARY APPROACH WHICH WILL ENSURE THE INTEGRATED USE OF THE NATURAL AND SOCIAL SCIENCES AND THE ENVIRONMENTAL DESIGN ARTS IN PLANNING AND IN DECISION MAKING WHICH MAY HAVE AN IMPACT ON MAN'S ENVIRONMENT. THE DRAFT STATEMENT WAS THE PRODUCT OF A CRASH EFFORT TO BEAT THE FIRST SCHEDULED DATE OF THE COURT HEARING. FURTHER, A GLANCE AT THE LIST OF PREPARATORS OF THE DRAFT STATEMENT REVEALS THAT ALL ARE PHYSICAL SCIENTISTS. NOTABLY LACKING ARE REPRESENTATIVES FROM ECONOMICS, LIFE SCIENCES, AND SOCIAL SCIENCES. IT ALSO APPEARS THAT THE EFFECT OF FULL DISCLOSURE WAS INHIBITED BY LACK OF COMPLETE INFORMATION FROM THE APPLICANT ON DEVELOPMENTS APPURTENANT TO THE POWER PLANT AND ON THE INTENDED USE OF THE ENERGY GENERATED BY THE PROPOSED PLANT.

THE ENVIRONMENTAL QUALITY COUNCIL, RECOGNIZING THESE DEFICIENCIES, AND AWARE OF SIGNIFICANT NEW INFORMATION, RECOMMENDED TO THE DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES THE ISSUANCE OF A REVISED DRAFT OR SUPPLEMENT TO THE DRAFT. THE COUNCIL DID NOT RECOMMEND ANY CHANGE IN

THE PROPOSED TIME FRAME FOR THE HEARING AND RECEIPT OF COMMENTS. OBVIOUSLY THE PROCESS OF CIRCULATION AND COMMENT MUST END AT SOME POINT. THE COUNCIL'S SUGGESTION WAS NOT MADE WITHOUT PRECEDENT NOR WAS IT MADE LIGHTLY. AN EXCERPT FROM THE DECISION OF ONE DISTRICT COURT BEARS DIRECTLY UPON THIS SITUATION -- "IT IS DOUBTFUL THAT ANY AGENCY HOWEVER OBJECTIVE, HOWEVER SINCERE, HOWEVER WELL STAFFED, AND HOWEVER WELL FINANCED, COULD COME UP WITH A PERFECT ENVIRONMENTAL IMPACT STATEMENT IN CONNECTION WITH ANY MAJOR PROJECT. FURTHER STUDIES, EVALUATIONS, AND ANALYSES BY EXPERTS ARE ALMOST CERTAIN TO REVEAL INADEQUACIES OR DEFICIENCIES, BUT EVEN SUCH DEFICIENCIES AND INADEQUACIES DISCOVERED AFTER THE FACT CAN BE BROUGHT TO THE ATTENTION OF THE DECISION MAKERS."

IT SEEMS DESIRABLE TO PROVIDE SOME GUIDANCE AS TO WHAT IS EXPECTED IN THE FINAL ENVIRONMENTAL IMPACT STATEMENT. THE VERY RATIONALE FOR CONSULTATION WITH OTHERS IS THAT A COMMENTING AGENCY OR GROUP MAY UNCOVER ERRORS OR OMISSIONS IN THE DRAFT STATEMENT. THE FINAL STATEMENT, WHEN ISSUED, WILL THUS IDEALLY BE COMPREHENSIVE AND WILL GIVE ADEQUATE GUIDANCE IN THE AGENCY'S DECISION WHETHER TO GRANT THE PERMIT.

AN IMPORTANT CONSIDERATION IN PREPARATION OF THE FINAL STATEMENT IS ADEQUATE RESPONSE TO COMMENTS, INCLUDING

RESPONSIBLE OPPOSING VIEWS. WHAT IS INTENDED IS THE INCLUSION OF ALL MEANINGFUL REFERENCES THAT IDENTIFY THE PROBLEM AT HAND FOR THE RESPONSIBLE OFFICIAL. AGENCIES HAVE PUBLIC VALUES TO CONSIDER OTHER THAN THE ENVIRONMENT. BALANCING THEM AGAINST ENVIRONMENTAL VALUES IS INHERENT IN THE DUTY IMPOSED BY MEPA. IF THE ENVIRONMENTAL EFFECTS ARE ADVERSE, THE AGENCY MUST CONSIDER WHETHER THEY OUTWEIGH THE BENEFITS OF THE PROPOSAL. THE IMPACT STATEMENT PROVIDES A BASIS FOR EVALUATION OF THE BENEFITS OF THE PROPOSED PROJECT IN LIGHT OF ITS ENVIRONMENTAL RISKS AND COMPARISON OF THE NET BALANCE FOR THE PROPOSED PROJECT WITH THE ENVIRONMENTAL RISKS PRESENTED BY ALTERNATIVE COURSES OF ACTION.

IN CLOSING THIS TESTIMONY IT SEEMS OBVIOUS THAT THE DESIRES OF THE PUBLIC AS COMMUNICATED TO THE DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES ARE FOR A BROADER JURISDICTION THAN THAT GIVEN BY THE MONTANA CLEAN AIR ACT TO THE DEPARTMENT. THE GOVERNOR OF MONTANA, THE LEGISLATIVE COUNCIL, AND THE ENVIRONMENTAL QUALITY COUNCIL ALL HAVE RECOMMENDED A POWER PLANT SITING AUTHORITY ACT TO THE 1973 LEGISLATURE. IT MAY BE SMALL CONSOLATION TO THE DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES BUT IF THIS ACT PASSES THE ENVIRONMENTAL IMPACT STATEMENT FOR THE COLSTRIP STEAM-ELECTRIC GENERATION PLANT MAY BE THE ONLY ONE OF THIS NATURE THE DEPARTMENT WILL EVER HAVE TO WRITE.

END.





# United States Department of the Interior

BONNEVILLE POWER ADMINISTRATION

KALISPELL DISTRICT OFFICE

P.O. Box 758, Kalispell, Montana 59901

In reply refer to: OKK

February 1, 1973

RECEIVED

Daniel Vichorek, Technical Writer  
State of Montana  
State Department of Health and  
Environmental Sciences  
Helena, Montana 59601

552 5173  
ENCL. 1  
D. Vichorek

Dear Mr. Vichorek:

This letter contains answers to the questions asked in your January 2, 1973 letter. In addition to the specific information you requested, I am enclosing "20 Questions on Electric Power Loads and Resources in the Pacific Northwest", published by the Pacific Northwest River Basins Commission.

1. What is the rate of line loss in lines of various size, particularly 230-kv and 500-kv lines?

Strictly speaking, for a given line at 230-kv or 525-kv (commonly called 500-kv), and with a given conductor size, the percentage power loss per mile at half and full thermal loading is shown below:

Line Voltage (KV)	Conductor		Power Loss/Mile	
	No. per phase	Designation	Half Load %	Full Load* %
230	1	Drake	.039	0.085
230	1	Pheasant	.033	0.073
525	2	Chukar	.014	0.029
525	3	Bunting	.015	0.033

\* 50° rise above 25° c ambient, wind @ 1.4mph. (Max. design loading)

Because of system reliability considerations, BPA lines are normally loaded slightly below half the maximum design thermal rating. These lines would operate near maximum thermal loading only during emergency conditions.

The above information should not lead to hasty conclusions because power transfers through a transmission grid can result in great variations in losses, dependent upon many factors. Generally, the total power flow on a transmission system will result in the least possible losses. The effect of an incremental power transfer on transmission losses may either add or subtract to the existing losses, depending upon the direction of prior flows and the magnitude of the incremental transfer.

2. What corridor width is necessary for 230-kv lines? For 500-kv lines?

Each standard BPA right-of-way for both single-circuit and double-circuit, steel structure, 230,000-volt transmission lines is 125 feet wide. The right-of-way width for steel-structure 500,000-volt lines varies between 135 and 165 feet, depending upon the type of structure used. Enclosed for your reference is an information sheet entitled, "BPA's Single and Double-circuit 500 kilovolt Transmission Towers". You will note that tower 4 carries two 500,000-volt circuits which requires a right-of-way width of only 140 feet, whereas, tower 3, also carrying two 500-000-volt circuits, requires a width of 165 feet. The height varies inversly with the right-of-way width depending upon tower type; tower 3 is 143 feet high and tower 4 is 176 feet high. The reverse side of the information sheet shows various configurations of the transmission towers.

3. When two 230-kv or two 500-kv lines are run parallel, how close together may they be?

The minimum separation of two parallel lines is based on the required electrical clearance between the closest conductors. The necessary distance between centerlines is determined by several factors, the main ones being:

- a. Line voltage - Higher voltage requires greater electrical clearance.
- b. Tower design - This fixes the position of each conductor in relation to the tower center.
- c. Span length - Longer spans allow more side swing of the conductor and, therefore, require greater separation.
- d. Conductor design and tension - These factors also affect the amount that the conductors will sway horizontally.

The following figures are typical separations between centerlines of two parallel lines currently used by BPA:

230-kv, single-circuit, wood-pole	85 feet
230-kv, single-circuit, steel	115 feet
230-kv, double-circuit, steel	115 feet
500-kv, single-circuit, steel	115 feet
500-kv, double-circuit, steel	160 feet

4. How wide is the necessary right-of-way for parallel lines?

The right-of-way width requirements are based on most of the same factors mentioned above. The criteria for "edge distance" (distance from centerline of each line to the edge of the right-of-way easement) is that it must be great enough to provide for conductor side swing plus safe elec-

trical clearance. Typical right-of-way widths for two parallel lines are:

230-kv, wood-pole	185 feet
230-kv, steel	240 feet
500-kv, steel	250 feet

5. How much land would be impacted where a single or double 230-kv or 500-kv line crossed range or crop land? Does this include the service road?

The impact of towers on rangeland is minimal. Livestock graze under and around the structures. The only area permanently removed from use is an approximate five-foot square around each individual tower leg. This amounts to about 500 square feet per mile of line. Cropland is disturbed to a greater extent, both in the area removed from production and in inconvenience to the farmer in his activities. The cropland permanently affected by tower sites is as follows:

	<u>Acres per Tower Site</u>	<u>Acres per Mile</u>
230-kv, single circuit, wood-pole	.001	.007
230-kv, single-circuit, steel	.018	.090
230-kv, double-circuit, steel	.018	.090
500-kv, single-circuit, steel	.020	.10
500-kv, double-circuit, steel	.028	.14

Access roads create additional impacts which vary greatly with terrain. In fairly flat topography (less than 5% side slope), permanent road construction is usually not required on crop- or rangeland. Access can be along the right-of-way on the natural ground surface, with only minor and temporary construction. In steeper terrain the road system will cause more impact than the line itself. A typical access road through rolling farmland will disturb an area 20 feet wide, which amounts to 2.4 acres per mile.

6. What data exists on the use of the power to be exported from Montana?

I presume your question refers to the power to be acquired from the Colstrip development by Puget Sound Power & Light Company. This private company is a member of the Joint Power Planning Council which has formulated and is implementing the Pacific Northwest 10-year Hydro-Thermal Power Program. The Joint Power Planning Council is composed of 4 private utilities, 104 public utilities and BPA. The Hydro-Thermal Power Program is a cooperative regional effort to meet the total load requirements of the Pacific Northwest (which includes the Puget Sound Power & Light Company's loads).

The power that Puget is acquiring from the Colstrip development will not

likely to be used in aluminum reduction plants. It is reasonable to assume that the load-growth additions will be similar in nature to that which is presently served, and evaluating data contained in the Company's FPC report for calendar year 1971, energy was sold to the following classes of consumers in the indicated percentage:

<u>Classification of energy delivered to ultimate consumers</u>	<u>Percent of sales</u>
Non-farm residential	56.8
Commercial	21.7
Industrial	18.8
Street & Highway Lighting	0.6
All other	2.1
	<hr/> 100%

7. Since the demand for electricity is growing far faster than the population in the Northwest, what is causing the increased demand?

The enclosed paper on "Power Needs in the Pacific Northwest to 1990" explains in a fair amount of detail the fact that total energy use has been growing much more rapidly than population and electric energy use more rapidly than total energy use and the reasons therefore. The chart following page 6 has been revised and I have entered the revised years and percentage growth figures on the old chart since we have not reproduced a new one as yet.

8. What percentage of the power will go for industrial use, lighting, aluminum processing, home heating, or cooling?

The chart following page 11 in the aforementioned paper shows the relative amount of electric power used for residential space heating. It also indicates, in showing the difference between 1950 and 1970, the population growth accounted for only 4,345 million kwh of the over 22,300 kwh increase in residential use in the West Group Area (the geographic area served by BPA, less loads of Montana and Idaho Power Companies) between 1950 and 1970. The greatest increase, over 18,000 million kwh, came from increased use per customer and the largest single item, almost 8,000 million kwh, was electric space heat.

Also enclosed are two tables. The first shows electric power requirements by major consumer classes 1950 through 1990. The 1950, 1960 and 1970 data are taken from reports to the FPC and the 1980 and 1990 data are our estimates based on the West Group forecasts. The second table breaks down these sales data a little further. It shows industrial energy sales as a percent of total electric energy sales in the West Group Area and sales to the aluminum industry as a percent of total sales and industrial sales. Not only are industrial sales expected to decline as a percent of total sales, but aluminum sales as a percent of either total or industrial sales are expected to decline drastically over the next 20 years.

9. What, in laymen's terms, are "design corona losses" in power lines?

Transmission line corona is the electrical breakdown of the air in contact with the high-voltage conductors. It is confined to the conductor surface and is encouraged by rain. In anticipation of this phenomena, transmission lines are designed to minimize corona losses.

Corona loss may be likened to the small leaks in the wooden pipes used in early water systems. Wooden pipes have now been replaced with cast iron and this small water loss no longer exists. Hopefully, technology will advance to where we can also eliminate corona loss. The only methods presently known are uneconomical, so corona loss is minimized but not eliminated.

As in the case of water loss, corona loss reduces the amount of product available for the intended use. However, compared to the amount of product delivered, the loss is extremely small. Corona losses vary between 1-10 kilowatts per mile during fair weather, and 10-100 kilowatts during foul weather.

There are no adverse effects associated with normal line corona activity except for occasional radio and television interference.

10. How much power does BPA now import to Montana? How much is exported from Montana?

Some discussion on terminology may be in order before attempting to answer your question. The term "electric power" is a term used in the industry to mean inclusively "power and energy". Strictly speaking, the term "power" is the time rate of transferring energy, and "energy" is that which is capable of doing work. Power (often called "demand" when associated with loads and "capability" when associated with generation or power-handling facilities) is measured in kilowatts; electric energy is measured in kilowatt-hours. There are also two broad categories of power -- firm and non-firm power. Firm power is intended to have assured availability and non-firm power does not have assured availability to meet load requirements.

During the 5 calendar years 1967 through 1971, BPA's total firm and non-firm energy sales in Montana have averaged about 4,351,600,000 kilowatt hours each year. The average annual energy actually generated at the Hungry Horse Project (the only Federal Project in Montana which BPA presently markets power from) has been roughly 950,400,000 kilowatt-hours. In terms of percentage, 78% of BPA's energy sales in Montana have been produced by generators located outside of the State.

Another term we often use is "average energy". This is determined by taking the total energy in kilowatt-hours, dividing by the total number

of hours in the period, resulting in a power (demand or capability) figure which if maintained throughout the period would transfer the total energy. The foregoing explanation allows me to express BPA's energy imports in a slightly different way. During the Fiscal Year 1972 (July 1, 1971 through June 30, 1972), BPA's average firm energy sales within our marketing area in Montana (West of the Continental Divide) was 418,900 kilowatts. These sales were to Cooperatives, 29,300 kilowatts; private utilities 145,100 kilowatts; Federal Agencies 4700 kilowatts; aluminum industry 302,400 kilowatts; and other industry (Stauffer Chemical Company) 36,400 kilowatts. In addition to these sales of firm energy, BPA sold 186,000 kilowatts average of interruptible power in Montana during Fiscal Year 1972, bringing the total to 604,900 kilowatts average.

The average firm generating capability of Hungry Horse Dam under critical water conditions is 221,000 kilowatts. A corresponding figure for Libby Dam, scheduled to begin generating in 1975, is 204,000 kilowatts. The total average firm generating capability of these two Federal Projects, with the power to be marketed by BPA is 425,000 kilowatts.

It must be recognized that the power flow situation is continually changing. For example, during the summer while Hungry Horse Dam is storing water, little or no power is being generated, resulting in most all of the energy BPA serves in Montana coming from outside the State. One of the uses of the new Dworshak (Idaho) - Hot Springs 500,000-volt transmission line is to carry the heavy power flow during the periods when Hungry Horse is not generating. Conversely during the wintertime when cold weather settles over the Pacific Northwest, the Hungry Horse Project will be generating at or near its rated peak generating capability of 285,000 kilowatts. The approximate peak demand of BPA-served loads in Western Montana during the Fiscal Year 1972 was 800,000 kilowatts.

On a state-wide basis, it appears that the generating sources within the State produce approximately 10 billion kilowatt hours annually, which is about the same amount required by the loads located within Montana. This statement is rough; no exhaustive study has been made. If you wish to pursue this further I suggest you contact the following organizations which operate generation and transmission facilities in Montana:

- U. S. Bureau of Reclamation, Billings, Montana
- Montana-Dakota Utilities
- Montana Power Company
- Washington Water Power Company.

I will be happy to provide generation and sales statistics for BPA-marketed power, if you wish to make such an analysis.

11. If Colstrip Unit 4 is built, what is the probable route of the 500,000-volt line out of Montana?

I am sure you recognize, assuming the Colstrip Unit 4 is built and that the private power company's desire to make use of the Federal Transmission System within the BPA marketing area, that the route for a 500,000-volt transmission line or lines can only be determined as a result of extensive studies. It is quite reasonable to assume the transmission facilities would connect to either or both Hot Springs Substation or Anaconda Substation. Both of these substations are strong power connection points in the transmission grid. On the west slopes of the Rocky Mountains the lines would probably either connect to existing facilities in the Spokane area or in the Lewiston area. Additional facilities from those areas westward would also be required. By referring to a topographic map, it is obvious that the number of mountain passes in Western Montana and Northern Idaho through which transmission facilities could be constructed are limited. To fulfill the intent of the National Environmental Policy Act of 1969, BPA will consider all available alternative corridors, if such lines are constructed.

12. Would new lines be necessary from Western to Eastern Montana?

I am certain additional lines will be required, both to serve loads in Montana and to provide a path for power to flow to the Northwest. We do not have any specific information available on what will be required, and you may wish to query the Montana Power Company in this regard.

13. What is the comparative cost of hauling the coal from Montana to generating plants near out-of-state load centers, and transmitting the power to the load centers from mine-mouth plants?

I do not have the answer. There would be some important judgment elements involved in such an analysis, such as probability of freight-rate increases. This would be of vital importance to Puget Sound Power and Light Company, and I suggest you make inquiry there.

Please let me know if additional information or clarification is desired.

Sincerely,



Ronald H. Wilkerson  
District Manager

Enclosures:  
As noted



COMMENTS OF THE ENVIRONMENTAL DEFENSE FUND  
REGARDING THE DRAFT ENVIRONMENTAL IMPACT  
STATEMENT ON THE PROPOSED MONTANA POWER COMPANY  
ELECTRICAL GENERATING PLANT AT COLSTRIP, MONTANA

page 1.<sup>1</sup>

Description of Proposed Action

The Venturi Scrubber Process was first patented in 1925 and put into commercial practice some 20 years later.<sup>2</sup> It is clear that this type of scrubber has certain advantages and disadvantages when compared with alternative methods of air pollution control. The Draft Environmental Impact Statement (DEIS) must deal with this subject in considerable detail. If there is evidence "that the Venturis will also remove most fluorides and trace metal compounds" such evidence should be cited and discussed. Past operational experience with Venturi Scrubbers and alternative modes of air pollution control is contrary to the optimistic outlook of the Draft Statement.

Pollution control technology, installed at the outset of operation at any given generating station, technically and economically tends to "lock in" the station for its usable life (35 to 50 years). It is imperative that the planned equipment be compatible with envisaged improvements in control technology, so that a retrofit of the generating station is not economically nor technically prohibited. This is particularly true in the case of coal-fired generating stations planned for rural regions with clean air, because it is likely that federal standards for atmospheric emissions of such stations will soon be made more stringent. Such changes in regulations are indicated by recent court interpretations of the Clean Air Amendments of 1970 and will apply to the proposed plant. If, as seems likely, the generating station under consideration is but the first in a series of plants to be operated at or near the same site, it will be critically important to plan for the maximum flexibility of operation, minimal degradation of existing air quality, attainment of economies of scale of pollution abatement, and retrofit of future best available technologies of pollution abatement equipment.

page 2.

The DEIS does not discuss the effect of long-term operation of a network of ash ponds on ground water quality. Ash ponds would serve as sumps for both solid and liquid wastes. (An inadequate description of this problem is outlined on page 26 of the DEIS). It is also important to discuss the quantities of waste involved with an appropriate extrapolation for any additional units now planned or envisaged.

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1 Page numbers in the margin refer to the DEIS.

2 Brian W. Lancaster and Werner Strauss. "Condensation Effects in Scrubbers in Air Pollution Control" Part I, edited by Werner Strauss. Wilen-Interscience, New York, 1971.

The operation of wet cross flow induced draft cooling towers needs to be discussed in greater detail. Employment of these devices should be compared to alternatives such as natural draft cooling towers. Mechanical or induced draft towers have a substantial potential for ground fog formation as well as sleet and ice formation during cold weather. Considerable attention must be given to the site selection as well as the local climate and flexibility of operation of the particular towers in question.

In addition to the potential for fogging and icing, mechanical draft cooling towers seem more prone to producing drift which may have an adverse environmental impact on the area immediately downwind from their site. The salinity of the drift may pose problems. Salinity is a function of the operational characteristics of the tower, the dissolved solids content of the cooling water, and the rate at which blowdown is bled from the cooling system. Little of the requisite information for calculating the impact of drift is available in the DEIS.

Mechanical draft cooling towers tend to be noisy in operation. Since there is no detailed description of these mechanical draft cooling towers in terms of the number of cells, rated horsepower of motor-driven fans, and plans for noise abatement (if any), it is difficult to calculate the impact of these devices on the adjacent population. We are informed of the environmental costs--in terms of unacceptable noise levels--of installing mechanical draft cooling cells to handle the cooling requirements of Indian Point Unit No. 2, a 873 megawatt generating station on the Hudson River.<sup>3</sup> The cooling requirements of a 700 megawatt coal-fired generating station in Southeast Montana are roughly half those of Indian Point Unit No. 2. Other parameters being equal, a reasonable assumption for cooling requirements for the proposed Colstrip Generating Station would require 19 mechanical draft cooling cells operating in the closed-cycle mode with each cell possessing an electric motor-driven fan rated at 200 hp., giving a total of 3,800 hp. The noise generated by these cooling towers is predicted to produce sound levels of 50 db. (A) at a distance of 3,500 feet. Consequently, an area of approximately 1.4 square miles will be in the unacceptable zone as defined by the Department of Housing and Urban Development.

Of this area, approximately 2 million square feet in the immediate vicinity of the cells will be in the "clearly unacceptable" classification with the remainder of the unacceptable area falling in the "normally unacceptable" classification. These particular acoustic levels are those which are emitted from the louvered face of the cells. The sound level on the cased face of the cell is expected to be from 5 db. to 10 db. lower, so the corresponding areas will experience lower noise levels. Therefore, the above hypothetical noise levels are conservatively high on the case-faced base side of the cooling cells.

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3 The Final Environmental Statement on Indian Point Nuclear Generating Plant Unit No. 2 (Docket No. 50-247) prepared by the staff of the U.S. Atomic Energy Commission (page XI-64).

Attention should be given to noise levels from future installations at this site, as well as the one under consideration at the present time. A much more complete site description (with detailed maps of the facilities) is clearly indicated.

### Pipeline and Water Supply

The DEIS describes the water supply and cooling system in only the sketchiest of terms despite the fact that this is a crucial feature of the generating station and one that will, in both the construction and operating phases, have a substantial impact on the environment. If the proposed generating station is but the first of a series of generating stations at or near this site, the cooling water supply system for the overall network of generating stations should be described at the outset of the first construction project. Information should be presented in the DEIS regarding the applicant's total water contracts for this region, future power needs, total fuel supply, and the like, since water in the area is a precious commodity and a limiting resource for industrial development.

Repetitive destructive impacts on the environment from the construction of a network of pipelines seems senseless. Yet, in failing to deal adequately with this subject at the outset, the decision-making bodies in the State of Montana may certify a future filled with applications of this sort. If, as discussed below, the initial pipeline is sufficient to serve a much larger generating complex, the DEIS has not candidly analysed the full environmental impact of the proposal. In either eventuality, the pipeline is a precedent-making feature of industrial development in the Colstrip area and needs to be examined with the greatest attention. Indeed, the plausible alternative of dry cooling towers should be probed in depth at this time.<sup>4</sup> No one should fail to recognize that the decision to certify the presently proposed cooling system on this plant may, by establishing a precedent, seal the fate of the Yellowstone River in perpetuity.

Inadequate or non-existent in the DEIS are discussions of studies (related to the impact on aquatic biota, migratory fish, primary producers and consumers, and fisheries) of the consequences of removing large quantities of cooling water from the Yellowstone River. Implicit in any such studies must be the view that, within the foreseeable future, a sizeable portion of that river could be diverted for industrial purposes. Thus, the aggregate impact including such phenomena as the impingement of fish on screens and entrainment of fishes in pumps and in industrial cooling systems should be considered at the outset of industrial development.

In particular, there should be no justification for approval of this diversion of cooling water on the basis that it constitutes a minor or negligible impact on the Yellowstone River Fishery if, in fact, it can be seen that future diversions will constitute a major adverse impact. There is no sound economic justification for permitting the aquatic biota of the river to subsidize the initial industrial development,

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4 A 20 MW(e) air cooled electric generating station is operating in Gillette, Wyoming and a 330 MW(e) facility is planned for the same site--also to operate with dry towers.

whilst imposing the bulk of environmental costs on future generations of water consumers in the area, if it is perceived that approval of this initial usage in any way precipitates future industrial and commercial water demands.

There is reason to believe<sup>5</sup> that the proposed pipeline for this power plant will be very much larger than required by a 700 MW(e) coal-fired steam electric generating station. The DEIS itself is suspiciously vague in this regard. For example, page iv of the DEIS refers to the pipeline as "24" diameter (minimum) approximately 30 miles" and on page 2 of the DEIS the pipeline is referred to as " . . . a buried steel pipeline at least 24-inches in diameter." [emphasis supplied]. Such a discussion of one of the most important features of this project is ambiguous and unsatisfactory.

There is no mention in the DEIS of the pumps required to move the water from the Yellowstone River to the generating station at Colstrip. Aside from the impact of these devices on the aquatic biology (by impingement, entrainment and bottom scouring) their size gives a reasonably accurate gauge of the near term plans of the Montana Power Company. Of course, an essential feature in future plans of the utility is the diameter of the pipeline itself.

Though the DEIS may describe the pipe as equal to or greater than 24-inches in diameter, it seems that a permit application describing the intentions of the Montana Company is on file at the Rosebud County Courthouse in Forsyth, Montana. This application calls for a 60-inch pipeline.

A 24-inch pipeline operating at a flow rate of 5.664 feet per second will supply 7,926 gallons per minute, sufficient to handle the total consumptive use of water of the 700 MW(e) generating station described in the DEIS. Table 1 depicts the electric generating capacity of such a complex as a function of pipeline diameter when the water velocity is 5.664 fps.

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5 c.f., the Billings Gazette series of articles on the Project commencing 29 November, 1972; also, repeated private communications from members of the Northern Plains Resource Council in Billings, Montana.

Table 1 <sup>6</sup>  
(Water Velocity = 5.664 feet per second)

Pipe Diameter inches	Flow Rate			Sustained Generation Capacity <sup>7</sup> MW(e)
	cfs.	gpm.	acft/yr	
24	17.7	7,926	12,800	700
36	39.8	17,830	29,000	1,575
48	70.7	31,700	51,000	2,800
60	110.3	49,540	80,000	4,350
66	133.7	59,940	97,000	5,300

We are further informed that the application for permit describing the intentions of the Montana Power Company describes the 60-inch pipeline as capable of delivering a flow of water of 250 cubic feet per second. Table 2 gives the sustained generation capacity of a power plant complex as a function of pipeline diameter at a flow rate of 12.85 fps., i.e., a rate of 250 cfs through a 60-inch diameter pipe.

Table 2 <sup>6</sup>  
(Water Velocity = 12.85 feet per second)

Pipe Diameter inches	Flow Rate			Sustained Generation Capacity <sup>7</sup> MW(e)
	cfs.	gpm.	acft/yr	
24	40.1	18,000	29,000	1,590
36	90.5	40,500	66,000	3,575 --
48	160	72,000	116,000	6,350
60	250	112,500	181,000	9,875
66	303	136,000	220,000	12,000

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6     1 cubic foot per second (cfs) equals 448.83 gallons per minute (gpm) or approximately 725 acre feet per year (acft/yr).

7     At 100% load factor; these data are based on cooling water requirements of 25.2 cfs per 1,000 MW(e) generated.

It is pertinent that the North Central Power Study<sup>8</sup> refers to an aquaduct from the Yellowstone River to Colstrip, Montana. This is described as a 66-inch pipe with a capacity of 130 cfs. or an annual water delivery of 90,000 acrefeet. This proposed pipeline will be operating at a slightly lower rate of flow than that described in Table 1 above, and would be sufficient to handle the cooling requirements of a 5,150 MW(e) coal-fired steam electric generating complex. It should be noted that the Montana Power Company was an active participant in the preparation of the North Central Power Study.

With the above information in full view, it seems that the discussion on water supply (and indeed the entire DEIS) has been less than forthright. Whether or not this represents a failure of the utilities to disclose their intentions fully to state decision-makers is of little significance. The Environmental Defense Fund believes this failing can only be remedied by the issuance of a revised Draft Environmental Impact Statement which describes the proposed water supply system comprehensively and the attendant environmental consequences of such a supply. Without such a discussion, it is impossible to analyse the full environmental consequences of this proposal objectively.

#### Transmission Lines

The DEIS fails to examine the full impact of transmission lines, switching facilities, and the like, upon the environment. There is a clear need to supply quantitative information about number of acres impacted, the compromise of aesthetic values in pristine areas, the irreversible commitment of private and public lands for industrial purposes, the adverse impacts of transmission facilities on wildlife, and the adverse impacts of transmission facilities on lands of an archaeological or historical value.

It is important to describe the degree to which the choice of any particular transmission corridor will delineate future routings of transmission lines for the utility in question (as well as other corporations which share interties and transmission facilities). If, as is indicated, this is but the first in a series of large coal-fired generating units in the area, there is an obvious need to enter into detailed open planning at the outset of the project. In particular, it is important to determine the activities of other utilities in the region. The past record of cooperation between the investor-owned utilities in the region, the Bureau of Reclamation, the cooperatively operated utilities and municipally owned systems has been a sorry one indeed.<sup>9</sup>

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<sup>8</sup> To North Central Power Study, Report of Phase I, Volumes I and II, October, 1971. Bureau of Reclamation, U.S. Department of the Interior, Billings, Montana, (Volume II, page I-34).

<sup>9</sup> c.f. for example the Mid-Continent Area Power Pool Agreement before the Federal Power Commission. Docket No. E-7734.

For both environmental and economic reasons it is important to plan for and determine interties between the various utilities in the region, the Bureau of Reclamation facilities, and other agency facilities, in order to plan for system stability. This will avoid costly duplicative transmission facilities and generating units. At the very least, these objectives should be spelled out and the ability to comply with them assured before the granting of approval for construction of any further generating units or transmission facilities of the Montana Power Company.

page 4.

Since the construction of a mine mouth coal-fired steam electric generating station is determined by these very economies of scale (e.g., transportation of fuel and ash disposal), that arise from proximity of the mining and combustion processes, there is no adequate argument for severing the environmental impact statement on mining from that which deals with the remainder of the operation. Indeed, there is every reason for uniting these impact statements in a revised draft form.

If the Montana State Department of Lands "will make intensive evaluations of the strip mining reclamation necessary for this facility" [emphasis supplied], there is no reason to approve construction or operation of this generating station until such time as the indicated studies are complete. If approval to construct is granted prior to complete stipulation and assurance of ability to comply with mining practices, the State of Montana will forfeit control of the operation and be faced with economic blackmail after the Montana Power Company and its partner have made a sizeable capital investment in the proposed facility.

The success of reclamation depends, of course, on a definition of terms. In areas such as Colstrip with low annual mean precipitation and wide annual variance of precipitation, the prospects for permanent reclamation seem poor (if the term means successful revegetation through the first drought cycle without irrigation or application of fertilizer). Thus "reclamation" in the West German, British, or Appalachian sense of the word has not been proven and does not seem favorably indicated in at least a portion of the Northern Plains States. Other aspects of reclamation (leveling of spoil banks, grading of high walls, and preventive measures to assure good local water quality) can and ought to be stipulated in approving the overall design and mining regimen of the proposed facility. Further, it is important to stipulate that the mining operations are not only in compliance with existing laws, but also with future State and Federal reclamation laws as a prerequisite to operation of the proposed facility.

The proposed 700 megawatt generating station will consume a little over three square miles of land during thirty years of strip mining. Additional envisioned stations will consume correspondingly more land. If this land is lost as a resource in perpetuity, it is important to assess the full environmental costs at the outset of operations. The land must not merely be allowed to be reassessed on the tax rolls at zero dollars per acre after mining has ceased (as has actually happened in Wyoming and elsewhere); indeed, full environmental and economic costs should be established at the outset for any damage that may occur in perpetuity.

## Historical Values

If an area is to be irreversibly committed to the strip mining of coal it is important to assess the impact of the operation on historical and archaeological values. To this end, it is advisable to consult with state and national historical and archaeological societies to determine the nature and extent of any adverse impacts.

## Recreation

The impact of this generating plant on tourism is not investigated at all. The impact of the proposed facility on wildlife and fisheries needs to be examined in greater detail. In particular, the migratory and feeding patterns of wildlife will be adversely affected by the physical obstacles imposed by the proposed facility, as well as by noise and increased human activity in the area. Perhaps most importantly, the Yellowstone River Fishery will be adversely affected by this and future operations scheduled for the same site. It is essential to establish liaison with State and Federal departments of fisheries and wildlife, as well as conservation, recreation, and sportsmen's organizations prior to the promulgation of the DEIS.

## Meteorology

It is essential that meteorological factors which affect local air quality are determined in the planning stage. These should include local wind conditions, prevailing temperatures, saturation deficits, and the precise nature and extent of inversion conditions. Such knowledge is essential for the choice and design of cooling systems--in this instance the selection of forced-draft wet cooling towers seems to have been made on the basis of incomplete meteorological data.

Regional monitoring appears to have been performed for some, but not all of the expected pollutants. For the one pollutant which is most difficult to control, (oxides of nitrogen) no background monitoring has yet been performed. The draft environmental impact statement suffers from a lack of presentation of wind roses for pollutants. It is impossible to review and comment objectively on the quantitative impacts of air pollution in the absence of such data. In the absence of any quantitative information pertaining to emissions, meteorology, topography and proven methods of atmospheric modeling, it is a relatively simple matter to "readjust a few parameters" and find the unit in complete compliance. The complete array of data and methodology must be presented in the DEIS.

As referred to above, the data in Table 1 of the DEIS is exceedingly difficult to interpret without the appropriate wind roses. There is a clear need to define the diffusion model employed for calculations of the proposed plant's contribution of pollutants. If, as is intimated, a complex of coal-fired generating stations is to be built, this DEIS is the appropriate vehicle for describing the contribution of all the proposed plants.

Particulates

The DEIS suffers from being totally dependent on data supplied solely by the applicant. It is important to note that controlling the emission of particulate matter to the level of 266 lbs. per hour depends on operating the scrubbers at maximum collection efficiency, in order to remove 53,200 lbs. per hour of particulate matter from the flue gasses at full load. Even a slight loss in efficiency will lead to a drastic increase in emissions of particulate matter. Table 3 compares the efficiency of operation of these scrubbers and particulate emissions:

Table 3

Efficiency of Particulate Removal	Particulate Emissions (lbs. per hour)	Particulate Emissions (Tons per year)
99.5%	226	1,165
99.0%	532	2,330
98.0%	1,064	4,660
95.0%	2,660	11,650
90.0%	5,320	23,300

Sizeable losses of efficiency in such equipment are not uncommon and occur as a consequence of: (1) inadequate technical experience with the operation of very large electrical generating units; (2) poor operation and maintenance; (3) corrosion or deposit buildup in the scrubbers themselves; and (4), the general fatigue of units operating at the outmost limits of their efficiency.

Other data in the DEIS can be employed to calculate that this generating station may be operated at an 89% load factor, although such calculation is somewhat sketchy as it depends on the statement given on page 41 that "90 million tons [of coal] will be burned in 30 years . . . ." Thus the full load emissions given in Table 3 should be corrected by multiplying by a factor of 0.89 in order to obtain the expected average emissions of the plant. A load factor of 89% is not inconsistent with the mature outage rate of 4 or 5 percent on top of routing maintenance, though it may be slightly optimistic.<sup>10</sup>

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10 See, for example, data supplied by the Edison Electric Institute's Equipment Unavailability Report 26-71.

It is inconsistent to compare the proposed coal-fired generating station with the Corrette plant of the Montana Power Company, since the Corrette plant is presently operating under a different array of stipulations and does not comply with EPA regulations for new coal-fired steam electric generating units. The Corrette plant presently emits 426 lbs. per hour under full load, but, if built today would be permitted to emit no more than 175 lbs. per hour at full load. Present particulate emissions from the Corrette plant are thus 244% of those permitted for new generating units.

Table 3 of the DEIS presents measurements of particulate matter (taken at what is evidently a single sampling site some nine miles east of Colstrip) for a six month period in mid 1972. As noted above, these and other data are impaired by the lack of discussion of regional meteorology. If, for example, inversion conditions are more frequent in the winter than during the summer, the statement that "( the winter will certainly bring reduced total suspended particulate values)" is questionable.

The discussion of dust is incomplete without a consideration of particulate matter which will be produced directly by the stripping of coal. Strip mining in a region does produce considerable quantities of dust and this source of particulate matter should be taken into consideration with the other sources described. This is yet another argument for uniting the present draft Environmental Impact Statement with the one proposed to deal with the strip mining aspects of the operation.

The computer dispersion model and the long-term concentration model should be described in the draft statement. The failure to provide these together with substantive meteorological data for the region is a serious shortcoming of the DEIS. A tremendous range of model results can result dependant upon: (1) the choice of the model; (2) the accuracy of easily calculated parameters--quantities of pollutants, stack gas velocity, and the like; (3) the discretionary choice of measurements and sites; and (4) the accuracy of meteorological phenomenon calculated for or observed at the Colstrip site. One of the most frequent shortcomings in power plant site selection results from the lack of attention that utility companies and regulatory bodies give to the meteorological characteristics of the site. This can occasion enormous expense when remedial action becomes necessary.

With regard to the discussion of particulates, sulphur oxides, and nitrogen oxides, it is important that the DEIS consider additional parameters. For example, it was stated on page 5 of the DEIS that the coal has an average composition of 8.5% ash and 0.77% sulphur. It is important to determine how and by whom this was measured, as well as to know how these parameters will change over the estimated lifetime of the power plant. How much variance is there in the sulphur and ash content of the coal? Will the proposed mining regimen dictate the initial combustion of low sulphur, low ash coal and in later years the combustion of coal containing higher quantities of ash and sulphur, or will the reverse be true? Regarding nitrogen oxides, what are the known operating characteristics of tangentially-fired pulverized coal furnaces of this design? Have nitrogen oxides been measured in the stack gasses in a unit of this design and if so, what are those measurements?

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Analysis of mercury indicates that the plant will emit somewhere between a few pounds and an amount in excess of 2 tons of mercury per year. We believe that, if careful systematic analyses are performed, a more accurate estimation of the mercury emissions can be provided. In view of the quantities of such elements as mercury and fluorine found in western coal, it is most important to have objective analytical data concerning these and other constituents. There is reason to believe that there are substantial quantities of fluorine in the coal in question, and that the 12.5 ppm F upper limits determined by Truesdale Laboratories may represent a serious underestimate of actual fluorine concentration.

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### Radioactive Substances

The use of Curies per year for describing radium emissions is ambiguous:

$^{226}\text{Ra}$  decomposes with a half-life of 1590 years to give  $^{222}\text{Rn}$  which then decomposes with a half-life of 3.82 days to give  $^{218}\text{Po}$ .  $^{218}\text{Po}$  then decomposes with a half-life of 3.05 minutes to yield  $^{214}\text{Pb}$  which decomposes with a half-life of 26.8 minutes to yield  $^{214}\text{Bi}$  which can decompose through a number of mechanisms and intermediates to yield a single stable end-product,  $^{206}\text{Pb}$ .

Just what is meant by "Ci/y" is therefore unclear, since this has the units of disintegrations per (unit time)<sup>2</sup>. Total-body doses to an individual (in mrem/year) at the plant boundary might be a suitable substitution, together with a calculation of the man-rem dose to the population within 50 miles of the site as a percentage of the suggested guidelines of the AEC set forth in 10 CFR 20 (with proposed modifications).

From the data provided it can be calculated that 2.1-2.31 tons of uranium and 5.22-9.0 tons of thorium will be emitted per annum. Total body doses ensuing from these materials should be calculated as above for radium.

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The DEIS fails to examine the synergistic effects of pollutants. The operation of any design of wet cooling towers will produce a very moist plume (visible at most times) which can be expected to mix with and greatly increase the humidity of the plume containing the stack gas pollutants. The DEIS should, for example, discuss the increased acidity of the "greater precipitation potential."

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It is important to emphasize that the impairment of visibility by particulate matter is most heavily dependent on the quantity of micron and sub-micron particles injected into the atmosphere. This topic is particularly germane in an area such as Colstrip which presently boasts such pristine air quality that the entire region is collectively known as the "Big Sky" country. Other things being equal, the mass of

particles falls off as a function of the cube of the radius (e.g., as  $4/3 \pi r^3$ ). Removal of 99.5% by weight of the particulate matter could, under the appropriate circumstances, effect the removal of only a tiny fraction of the micron and sub-micron sized particles. It is important to know the efficiency of the Venturi Scrubbers in the removal of such small particles. Thus, considerably more analysis is necessary before one can safely make the statement which appears on page 21 of the DEIS, that: "Particulates are considered the main culprit in visibility reduction and aesthetics, but their effect here will be minimized due to the low emission rates resulting from a 99.5% control efficiency."

The DEIS states that visibility reduction might be expected to "... be rare in the Colstrip region because of the relatively low humidity as compared with other areas of the country. It is well established that high humidity combined with sulphur oxide in the atmosphere contributes to visibility reduction."

At full load, the proposed generating station is expected to produce 6,646 gallons per minute (gpm) of water in evaporation and drift from the cooling towers, 500 gpm in evaporation and entrained water originating in the passage of the flue gasses through the scrubbers, and an unspecified amount of water vapor (dependent on the hydrogen and water content of the coal) from the combustion of the fuel. As noted above, the DEIS fails to discuss the mixing of the plumes from the cooling towers and the stack gasses. Hence, such statements as that quoted on page 21 of the DEIS are without substantiation. It should be noted that in other locations the mixing of these plumes is not uncommon.

It is reasonable to expect that a varying portion of the water vapor from the cooling towers will, in fact, continually mix with the stack gasses, while another varying portion may indeed be a "low level source" leading to fogging and ice formation during periods of cold weather. It seems that inadequate or no modeling has been performed to examine these problems. In addition to the missing information noted earlier in these comments, one must know the exit characteristics of the water vapor plume from the cooling towers.

page 22

If "... a visible plume will be evident from the stacks that will vary in size depending upon the temperature and humidity," why is no mention made of the visible plume that will be evident from the cooling towers? Why is there no discussion of the possibility of ice formation during cold weather? Why is no mention made of the potential hazards to travel as a consequence of ice and fog formation?

#### Effects on the Ecosystem

Discussion of effects on the ecosystem seems most inadequate. This is particularly so in view of the evidence that the proposed generating station may be only the first in a series of large steam electric generating stations at or near Colstrip. The effect of industrializing a rural agrarian region with the attraction of large

quantities of cheap electric power is of overwhelming importance to the survival of wildlife. It may be that "a quantitative estimate of these effects is impossible at this point in time, given our present understanding of the fate of pollutants in the ecosystem," but there is a growing body of substantive knowledge which allows us to make qualitative predictions. Instead of delving into this subject, the DEIS appears to succumb to helplessness, as if the fate of this region were completely in the hands of the Montana Power Company. The inadequacy of this portion of the Draft Environmental Impact Statement is sufficient in itself to compel the issuance of a Revised Draft Environmental Impact Statement before further action is taken.

page 23

#### Emission Control Guarantees

The DEIS reads: "The problem of plugging and fan imbalances from flyash and flyash and sulphur oxide combinations is recognized. The few recently-constructed power stations now equipped with scrubbers are experiencing these problems and investigating possible solutions." This portion of the Draft Statement would benefit by a discussion which names these stations and delineates the problems and solutions in detail. It seems that in any certification of these generating units and scrubbers, it should be stipulated that operation would not be permitted unless the efficiency of particulate and sulphur dioxide removal was at or above the guaranteed level on the emission control systems. The DEIS suffers generally from a lack of discussion of sources. A Revised Draft Environmental Impact Statement should incorporate detailed information on the emission control system, together with material germane to this subject (available, for example, from the U.S. Environmental Protection Agency.) Since the Montana Power Company budgets and spends little or no money on research in this area, their confidence " . . . that scrubber systems are inherently workable and that these problems can be met by design or process change" seems at best secondary to the confidence expressed by experienced operators of the equipment.

page 24

A number of these "Special Environmental Studies" need to be performed prior to certification of any aspect of the proposed project. Of paramount importance are: (1) the gathering of meteorological data; (2) the precise determination of the presence of trace elements in coal and their disposition through combustion; (3) additional air quality monitoring; and (4) broad ecological studies.

The most important aspect of the Participant's proposed environmental policy is full and open planning. If the Montana State Department of Health and Environmental Sciences has in any way been limited in the preparation of the DEIS by the failure of applicants to supply full and complete details on its proposed operation, then the proclamation of future behavior by the applicant on pages 24-25 of the DEIS is of dubious merit. The DEIS sorely requires substantive documentation and detail. Much of this information can be supplied only by the applicant. If, in the future, the full details of operation, maintenance and monitoring are withheld from the public by the utilities responsible for enforcement, we are less than sanguine that these promises will be kept.

page 25

Again the discussion of dust suffers from a failure to mention particulate emissions (coal dust) from the actual mining of the coal. Potential for groundwater contamination by leaching of the ash should and could be studied prior to the commencement of mining and ash disposal.

page 26

The concentration of dissolved solids as well as slimicides and the like in the blowdown from the cooling water may present a groundwater contamination problem, and not merely "precipitate out into the pond." These materials could and should be easily quantified and described in the DEIS.

The disposal of sewage through dilution flows in Armell's Creek should be reevaluated with attention given to full compliance with the 1972 Federal Water Pollution Control Act.

page 28

We note with interest the statement that: ". . . the proposed Colstrip plant may be only the first of many industrial developments that could conceivably alter the land use of most of the Fort Union Region." This statement deserves elaboration, particularly in view of the indications that a number of additional electric power plants presently are being planned for this region.

page 29

Though it may be impossible to quantify the changes in the flora and fauna discussed in this section, we believe that it is possible to ". . . predict the major changes in such activities as sport fishing." Thus we take exception to the DEIS and further suggest that the Revised Draft Environmental Impact Statement attempt to make some qualitative predictions --with the help of available sound ecological modeling--as to the major changes in composition of flora and fauna attendant to the various scales of industrial development which can be envisaged for the region.

page 30

#### Impact on the Human Environment

An increased tax base is one tangible benefit that can result from industrial and commercial development. Any discussion of impacts on the human environment should be accompanied by a detailed description of the expected tax revenues delineating the individuals, municipalities, and governments to whom those benefits will accrue. Will the costs occasioned by the proposed development be equitably defrayed by tax revenues? To what extent are "more and better educational facilities" required in this region? What "transportation systems" and "communication systems" -- besides the private automobile and the existing roads and media--are envisaged for this region?

The discussion of the impact on the human environment, the senses and the community on pp. 29-32 is interesting, although not particularly enlightening. For example on p. 30 of the DEIS we read:

Traditionally, agrestic life styles have been slow paced and relatively simplistic, whereas existence

in an industrial society is characterized by a hectic, rapid pace complicated by such necessities as the social graces and who gets a key to the washroom.

It is not clear that meaningful sociological expertise has been brought to bear on the problems discussed in these sections. The vitae of those individuals preparing the DEIS indicate training in engineering and the physical sciences--but not sociology. The lack of sound rural sociological analysis of the human environment is a serious shortcoming of the DEIS.<sup>11</sup>

With regard to other areas of the U.S. where one can "... perceive the effects of unplanned and poorly planned development in a rural-agrarian area" we believe a compelling example is the Southwest energy complex consisting of the Four Corners, Navajo, Huntington Canyon, Mojave, San Juan and Kaiparowitz Power Plants having a total planned capacity of 36,000 MW(e). If this proposal has even the faintest chance of being the first step in a parallel direction (i.e., Colstrip, Birney, and Gillette), it is obvious that very much more careful planning must be performed.

The entire section dealing with impact on the human environment fails to discuss any impacts on human health. This is a most serious omission.

page 32

Any discussion of noise levels in the area should be included in a discussion of human health impacts and should include a detailed analysis of the noise produced by the proposed cooling system. It should be recognized at the outset that noise constitutes much more than an aesthetic problem--it is frequently a serious human health insult. Due attention must be given to compliance with The Noise Control Act of 1972, as well as the Occupational Health and Safety Act of 1970.

page 33

The list of adverse environmental impacts which cannot be avoided seems incomplete. It should certainly include the impact on wildlife and fisheries, the impact on groundwater quality, as well as the quality of the Yellowstone River, the impact on regional climate, the local potential for fogging and icing, human health impacts in the region including noise, and a discussion of the various impacts which can be expected in the aftermath of stripmining (only briefly alluded to on page 41 of the Draft Environmental Impact Statement).

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11. A similar comment applies to the lack of economic analysis discussed below.

Alternatives to the Proposed ActionA. Not to Construct

The DEIS contains no discussion of the need for this power within the Montana Power Company's own service territory. The bulk of this new power may be exported to the Montana Power Company's partner in this venture, the Puget Sound Power and Light Company. The lack of any discussion of the advisability of degrading the environment of Montana to satiate the electric demands of the Pacific Northwest is a serious flaw in the DEIS and presents another strong motive for issuing a Revised Draft Environmental Impact Statement prior to the initiation of any further action in regard to this proposal.

B. Other Fossil Fuels: Oil and Gas

In view of the relatively poor apparent heat rate of the proposed plant (the calculated efficiency is 35.2%),<sup>12</sup> the alternative of reserving this particular coal deposit for future exploitation (either combustion with improved technology or coal gasification) should be explored.

C. Nuclear Fission Plants

The argument that "... energy required to process this fuel [enrichment in  $^{235}\text{U}$ ] for power plant use likely contributes, at another location, environmental degradation." is sound. However, the statement that "fission plants require vast quantities of cooling water..." is unnecessarily vague and implies that the proposed plant has, in comparison, only a modest requirement for the consumptive use of water. In fact, the proposed plant will consume roughly 70% of the water required by a 700 megawatt nuclear fission plant of recent design operating at 33% efficiency. It should be noted that Philadelphia Electric Company and other utilities have ordered high-temperature gas-cooled nuclear reactors which will operate at roughly 41% efficiency. These latter devices will consume about the same amount of water per kilowatt hour produced as the proposed 700 megawatt coal-fired installation in Colstrip.

D. Solar Energy

Although the direct conversion of solar energy into useable electric power is not yet technically or economically feasible on a wide scale, the conversion of solar energy into heat (e.g., for space or hot water heating) is now a workable and

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<sup>12</sup> This figure should be reduced to compensate for pumping requirements, cooling tower fan requirements and pollution abatement equipment requirements--all presently unknown. Transmission losses are not discussed, either.

marketable technology in a number of areas in the country. A considerable body of knowledge on this subject now exists and a number of groups (e.g., the Environmental Quality Laboratory at the California Institute of Technology) are seeking the speedy implementation of this technology in residential, commercial and industrial markets. Insofar as the electric power production of the Montana Power Company is converted into heat at the site of demand for purposes of space and water heating, it is germane to investigate the suitability of solar energy as a substitute.

age 37

Utility promotional efforts and discount rates for electric heating should be carefully reviewed and, if necessary, abated. It seems foolish to increase the rate of growth of electrical demand unnecessarily by promotional activities which may not be in the best interests of the residents of the State of Montana. Peak demand charges should be instituted in order to internalize the external environmental costs of both the present demand and the growth of that demand.

There can be no question that a great environmental blessing to the Northern Plains States and especially Montana and Wyoming would be the lessening in the rate of growth of demand for electricity in the nation. In view of the plans of many energy companies and utilities, any reduction in the rate of exploitation of Montana's resources would bring benefits to the people of Montana in terms of human health, aesthetics, a broader brighter outlook for the tourist industry, and a reduced demand upon the state's free flowing rivers and streams.

Insofar as charity begins at home, the State of Montana must address the problem of demand for electricity within its own borders. This should be done with a view towards increasing the efficiency of use of electric power as well as insuring that the large users--those who presently pay the lowest rate per unit energy consumed--pay their full fair share of the environmental costs occasioned by the production and delivery of electric power. If Montana chooses to export its coal resources in the form of electricity, then everything within its power must be done to ensure that the full environmental costs of producing the power in Montana are assessed upon the distant consumer.

If a serious effort is to be made in controlling the demand for electric power in the State of Montana, it must be recognized immediately that a large portion of the financial returns to electric utilities accrue in proportion to their rate of growth. In general, the most rapidly growing electric utilities have the highest rate of return. This is the consequence of the reward system imposed by regulatory bodies. It is no coincidence that the Montana Power Company has enjoyed the highest rate of return of any electric utility in the country for several years during the past decade. It has consistently been one of the top five utilities in rate of return in the nation. If we are to cope with the demand side of the problem, every effort must be made to re-examine the way in which carrots and sticks are apportioned to the electric utilities industry. It is also germane to note that Montana Power just received a substantial rate

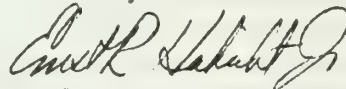
increase from the state Public Utility Commission. We should not be complacent about the environmental consequences of such a rate increase--traditionally, high profitability, a strong position in the capital market, and recent substantial rate increases are intimately coupled with very high rates of utility growth. This, of course, leads directly to constructing the proposed steam electric generating station in Colstrip, Montana.

The failure to discuss any economic data or to examine the demand for power in Montana is one of the most glaring omissions of the DEIS. At the very least, the Montana Environmental Policy Act is an "open planning" statute. In the absence of hard economic ecological and engineering data, vague qualitative statements pertaining to benefits and costs fall into the realm of conjecture, not open planning.

### CONCLUSION

In view of the paucity of data provided and the indications that one major aspect of the project--the 30-mile pipeline from the Yellowstone River to Colstrip--may be scaled to handle a very much larger complex of coal-fired steam electric generating stations, the Environmental Defense Fund urges the promulgation of a Revised Draft Environmental Impact Statement which will be both substantive and candid in dealing with the proposed power plant complex.

Submitted by:



Ernst R. Habicht, Jr., Ph.D.  
Environmental Defense Fund, Inc.  
162 Old Town Road  
East Setauket, New York 11733  
516-751-5191

REGISTERED  
QUARTER  
HORSES  
HEREFORD  
CATTLE

WALLACE D. McRAE

ROCKER SIX CATTLE CO.  
FORSYTH, MONTANA

November 16, 1972

Air Quality Bureau  
State Department of Health and  
Environmental Sciences  
Cogswell Building  
Helena, Montana 59601

Dear Sirs:

Since I live on a ranch in the Colstrip area, I am extremely concerned by the implications of the generation plants that are now under construction at Colstrip.

The following questions and comments are in response to the Environmental Impact Statement on the electrical generating plants at Colstrip.

On page 1, paragraph 1, there is an error stating that the generating station is "proposed" when in reality, the plant(s) have been under construction for some time.

In paragraph 2, I want to stress the importance of this application, since its approval, or disapproval, will have far-reaching effects on future plants. The decision will be much more important as a precedent than merely answering the question as to whether or not this facility is to be completed, and operated. There will be a further precedent made as to whether the state should accept applications for construction long after the actual construction has been underway when considering future plants of this kind. ✓

On page 2, paragraph 1, I wonder if consideration is being given to the deleterious effect of bottom, and percipitated ash on groundwater. ✓

Concerning "Pipeline and Water Supply, on page 2, the companies are planning, and currently surveyingfor, a 60-inch water pipeline from the Yellowstone River, and are apparently planning their pipeline to supply subsequent plants at Colstrip in addition to the two now under construction. The on-going construction, and the 60-inch line that is planned, appear to be based on the assumption that not only is the present application going to be approved, but that future applications for construction will be summarily approved, as well.

In the section on Transmission Lines there is a further indication that the companies believe that the application will be routinely approved since they have already begun construction of one of the power lines.

Section 4 illustrates the importance of this application relative to subsequent plants.

In section 5 the word "proposed" again bothers me since construction has been underway for some time in what appears to me to be not only a violation of

the law, but a direct insult to your department, and the people of Montana.

In section 5, B, I wonder what the consequences, and the nature of the action would be if the emission control system will not perform as "guaranteed". Can, and will your agency shut the plant down if it is constructed, but fails to operate as "guaranteed"??

In Chapter II, Section C, Land Use, the minimization of the lumber industry is done by comparison to the western part of Montana. I feel that the lumber industry is very important to Rosebud County. The figure of 11,000,000 bd. ft. sticks in my mind as being the annual county-wide production in recent years. Due to the economic importance of timber on the Northern Cheyenne Reservation, and the Custer National Forest, and the susceptibility of ponderosa pine to sulfur dioxide, I believe the economic impact of the lumber industry should be stressed, rather than dismissed as being unimportant.

In Chapter III, Section A, 1, the three questions are essentially unanswered and this is the crux of the emission problem. The application should not be approved until, and unless the answers to these very important questions are definitely resolved, and are completely and unequivocally acceptable to the state, and those of us who live under the shadow of the stacks. There is little comfort for me in the statement, "Diffusion modeling indicates that only in rare cases ~~will~~ will either state or federal ambient air standards be approached or exceeded." That "rare case", or the cumulative effect, might be all it takes to kill alfalfa, thereby destroying the hay base on many ranches in this area, precluding their continuation as viable economic units.

Billings is within 100 air miles of Colstrip, and the additive effects of that ~~little~~ city's refineries, and the Corette plant should be considered. The bentonite plant at Vananda, and the tepee burners at Lane Deer, and Ashland, as well as open burning dumps in many towns (including Colstrip) should also be considered as contributing factors to degraded air quality.

There is a serious error on page 13 relative to the sampling site nine miles east of Colstrip, and to a lesser degree other sampling sites as well. The sites are nearly all along dusty county roads, and the site nine miles east of Colstrip is in a ranch yard where many vehicles, and mowing equipment passed close by each day during the sampling period. Vehicle exhausts, and the presence of a trash-burning barrel in close proximity to the sampling equipment preclude the assembling of any meaningful data.

No mention of the doubling effect of sulfur dioxide, and particulate matter in combination, and their effect on respiratory tract and eye irritations was made.

Under paragraph 5, surely more tests should be run and the effects of these trace elements should be understood before construction is allowed to continue. There are many more trace elements that should be investigated than the few mentioned. There is evidence that selenium is naturally in such relatively high concentrations that it might already be a limiting factor in livestock production in this area. "Testing for radiation will be conducted if and when the plant ~~is allowed~~ begins operations.", sounds like thinking about closing the barn door after the horse is gone.

No mention is made that the microparticulate matter is the size that will escape into the atmosphere. This is the hardest to capture, and is the most damaging size of the particulate matter from a health standpoint.

On page 24, the monitoring of air quality by Montana Power Co. is rather like running a fishing contest by the honor system. The guy who stretches the truth the furthest gets the prize.

Continuing on page 24, and 25, I take ~~4~~ with a grain of salt all of the high sounding things the MPC says it will do. Number 4 is especially suspect since Company personnel have already told a group of area residents that the Company plans to build 7 plants at Colstrip with a generation capacity of 10,000 megawatts. The cavalier attitude exhibited by constructing without a permit is hardly consistent with the pious sounding number 8, unless they are acknowledging that your department has already capitulated to their wishes, and that your approval is ~~assumed~~ to be automatic. Perhaps they meant that all local, state, and federal agencies and groups responsible for the protection of our environment should work harmoniously with the Montana Power Company and Puget Sound Power and Light Company to make the Colstrip project an asset in the companies' ledgers.

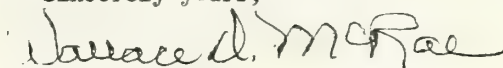
On page 31 you state that "...the basic economic pitfalls in an exploitive industry cannot be avoided." This is erroneous. The pitfalls in this instance can be avoided by disapproving the application for permit.

fifth

On page 32 Section 6, I would add a ~~sixth~~ area that is already suffering from the impact of the increase in population, and this is the school. Perhaps this was included in the Economic and social parameters, however.

In rereading this letter I find that it smacks of insincerity and facetiousness, but rather than rewriting it to remove the offensive portions, let me say that I sincerely believe that you should not approve the construction of these plants. Perhaps I feel this way because my ranch, and way of life are threatened. Perhaps I am selfish in wanting the world to pass me by. But I think that if these plants are completed, and they and other plants like them go into operation, all of us in Montana are going to look some day at a scarred landscape under a filthy sky, cut by dry river beds, populated by a callous, socially chaotic population and we will say what fools we were for not stopping this exploitation when we had the chance. I believe you said it all on page iii, in the Foreward, when you said, "The long-term adverse effects may well outweigh the short term gains. I urge you to disapprove the application.

Sincerely yours,



Wallace D. McRae



NOV 29 1972

November 28, 1972

Winter Air Quality Bureau  
State Department of Health and Environmental Science

Dear Sir

As a full time commercial pilot I have been aware of and indirectly involved in the Calstrip and Decker mining projects.

I flew the railroad people over the Area on their initial sight seeing trips. I have flown numerous aerial surveys over the Area for Private Citizens, mining and State officials.

In registering my strongest objections to the whole project, I would like to point out the existence of a persistent inversion layer over this entire Area during many days of the winter months. In fact one existed for several days only last week. This condition will trap the pollutants close to the surface and the Yellowstone Valley will become one vast chimney.

Respectfully

Harry L. Corbin

1618 Pearl St.

Missoula City, Montana  
59301





# MONTANA CONSTITUTIONAL CONVENTION

STATE CAPITOL • HELENA, MONTANA 59601 • TELEPHONE 406/449-3750

RECEIVED

JEAN M. BOWMAN  
District 8 Delegate  
Secretary to Convention  
Phone: 449-3764

HOME ADDRESS:  
2244 Fairview Place  
Billings, Montana 59102

ENVIRONMENTAL SCIENCES

DATE: November 18, 1972

Mr. Benjamin F. Wake, Administrator  
Department of Health and Environmental Sciences  
Cogswell Building  
Helena, Montana 59601

Dear Ben:

I want to register my opposition to the proposed mine-mouth generator at Colstrip. I have read the Environmental Impact Statement prepared by the Department of Health and Environmental Sciences, and this seems to indicate that air quality standards will be met by the proposed plant. However, of an equally serious nature is the un-regulated impact on river water, soil usefulness after being stripped, and the unstable tax base that will result from the proposed plant.

I feel that there is more to consider here than merely the emission data. The long-range effects of this proposal should far outweigh the immediate short-term benefits when considering whether or not to allow this plant to become a reality. The State Department of Health is responsible first to the people of Montana, and the benefits to be gained by Montanans by this proposal are negligible. We will contribute the coal, for which we can expect to receive at this time, only minimum compensation. In return for this we will sacrifice much of our land and the life style of many of our people. We will realize a drastic change in land use which has many unknown ramifications. We will provide the use of an undetermined quantity of water. We will live with the emission of gasses and trace elements into an environment which is relatively pure, with no data to suggest what the effects on the ecosystem will be.


If it is determined that this proposal is to proceed, some method must be devised by which the recipients of this power help to bear the burden of its cost. If Montana must, by the unique composition of its coal, contribute so heavily to the nation's energy needs, it should be adequately compensated.

Instead of gearing ourselves to the depletion of our coal for an impending "crisis" which will not be solved by this depletion, we would be wiser to direct our efforts in the area of investigating thoroughly some of the proposed alternatives mentioned in the Impact Study, by be-

ginning the painful process of grinding down our efforts at conspicuous consumption, and by making an effort to conserve what we have--not to deplete it.

I certainly feel that there is little to be gained by Montana by proceeding with the construction of this plant.

Sincerely,

  
Jean M. Bowman

November 21, 1972

Air Quality Bureau  
State Department of Health and  
Environmental Sciences  
Coggswell Building  
Helena, Montana

RECEIVED  
NOV 26 1972  
ENVIRONMENTAL SCIENCES  
DIVISION

Dear Sirs:

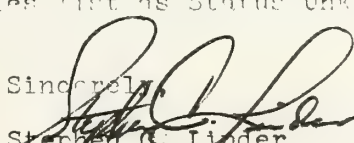
My interest in the proposed Montana Power Company's  
expanding plant at Colstrip is one of a personal matter but  
more important from a professional standpoint. I am a  
Biologist whose knowledge of the detrimental effects that a  
company such as Montana Power can have on the environment  
extends further than the average concerned citizen.

Recently, under the helpful guidance of Lee Denson,  
Environmental Specialist for the Bureau of Reclamation and  
former Assistant to the Chief of the Endangered Species  
Program in Washington, D.C., I have been working on the  
critical situation that presently faces the Paddlefish  
status. I am now in the final stages of completing this  
study and hope to have it ready to send back to the Depart-  
ment of Endangered Species by the end of this week. They  
have already reviewed the study and had asked me to make a  
few corrections and send it back to the department.

You may be wondering how Montana Power will have any  
affect on the Paddlefish. Let me briefly explain. The  
proposed evaporators will require a certain amount of  
water from the Yellowstone River. The Paddlefish, of which  
there are two species, North American and China, are  
representatives of an ancient and primitive group of which  
very little is known. Spawning has only been observed once,  
literature is either outdated or scarce and they are isolated  
by the various dams on the ~~Missouri River-Mississippi River~~  
Systems. Their status is UNKNOWN but yet is classified as  
a scarce fish in most states including Montana. Successful  
spawning has been determined to rely very heavy on rising,  
warm water levels and is the only initiator of the spawning  
migration process. Another words low water levels, decreased  
water flow and cold water inhibit successful spawning.

If more information is needed as to data, literature  
cited etc., I will be glad to forward as many copies as  
necessary in order to help in considering this one important  
species. I have spent more than nine months trying to  
compile enough information that would warrant placing this  
fish on the Endangered Species list as Status Unknown.

Sincerely,

  
Stephen C. Linder



INTERNAL MEDICINE  
 ALFRED W. FULTON, M.D.  
 ALLAN LEE GOULDING, M.D.  
 GEORGE R. BROSIUS, M.D.  
 PAUL V. MOYER, M.D.  
 WARREN D. BOWMAN, JR., M.D.  
 HEMATOLOGY  
 DONALD L. WICKS, M.D.  
 NEPHROLOGY  
 RONALD H. SMITH, M.D.  
 INFECTIOUS DISEASES  
 PHILLIP E. GRIFFIN, JR., M.D.  
 RHEUMATOLOGY  
 WALTER C. DEONAN, M.D.  
 CARDIOLOGY

GENERAL SURGERY  
 EDWARD W. GIBBS, M.D.

GENERAL, VASCULAR  
 AND THORACIC SURGERY  
 O. ADRIAN JOHNSON, M.D.  
 HEWES D. AGNEW, M.D.

CARDIAC, VASCULAR  
 AND THORACIC SURGERY  
 JOHN W. HEIZER, M.D.

NEUROSURGERY  
 ROBERT C. WOOD, M.D.

ALLERGY  
 L. BRUCE ANDERSON, JR., M.D.

DERMATOLOGY  
 THOMAS P. GORMLEY, M.D.  
 WILLIAM H. SMOOT, M.D.

OBSTETRICS AND GYNECOLOGY  
 EDWARD A. BARROW, M.D.  
 EDWARD F. RANDAK, M.D.  
 H. C. KATZER, III, M.D.  
 LEE A. RAITZ, M.D.

OPHTHALMOLOGY  
 JAMES S. GOOD, M.D.

ORTHOPEDICS  
 WALTER H. HAGEN, M.D.  
 STERLING R. HAYWARD, M.D.  
 STANLEY J. YODER, M.D.

OTOLARYNGOLOGY  
 STEPHEN A. KRAMER, M.D.

PATHOLOGY  
 EDWIN C. BEGARD, M.D.  
 GORDON L. COX, M.D.

PEDIATRICS  
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 RICHARD C. REEM, M.D.

UROLOGY  
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 C. DALE VERMILLION, M.D.

RADIOLOGY  
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 ALAN D. FLYNN, M.D.  
 V. PAUL JOHNSON, M.D.  
 WILEY R. BLAND, M.D.  
 CONSULTANTS

ADMINISTRATION  
 ROBERT G. TIRRELL  
 KATHLEEN SULLIVAN  
 RICHARD W. JOHNSON

# THE BILLINGS CLINIC

NINTH AVE. NORTH AT BROADWAY  
 BILLINGS, MONTANA 59103  
 406-252-4141

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NOV 20 1972

ENVIRONMENTAL SCIENCES  
 DIVISION

November 20, 1972

Air Quality Bureau  
 State Department of Health  
 Cogswell Building  
 Helena, Montana 59601

Dear Sirs:

It is with increasing frustration that I view the continuous degradation of the quality of air in Montana particularly in Billings where the addition of the new Montana Power plant has appreciably added to the pall of smog during the past few years. I am an allergist and see many patients with severe asthma all of whom are noticeably worse during inversions. With the advent of yet another monster power plant in Eastern Montana, this can only get worse increasing the already serious problems in asthmatics, chronic bronchitics and patients with emphysema not to mention the increased problems that patients with hay fever, perennial allergic rhinitis and chronic sinusitis face with these pollutants.

I, therefore, protest the further degradation of our air in Montana through callous emissions from the huge power plants contemplated by Montana Power for the mindless increasing consumption of power in this country. In my opinion, if people want power, they should be made to pay for it at the price necessary to assure that its production will cause a minimum of pollution.

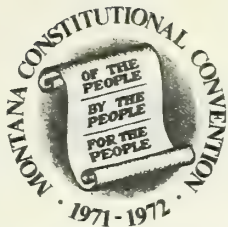
Sincerely yours,

*L. Bruce Anderson, Jr.*

L. Bruce Anderson, Jr., M. D.

LBA/ds





# MONTANA CONSTITUTIONAL CONVENTION

STATE CAPITOL      HELENA, MONTANA 59601      TELEPHONE 406/449-3750

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NOV 21 1972  
ENVIRONMENTAL SCIENCES  
DIVISION

Box 1388  
Glendive, Mont.  
Nov. 19, 1972

LOUISE CROSS  
Delegate, District 3  
Chairman:  
Natural Resources and  
Agriculture Committee

Air Quality Board  
Dept. of Health and Environmental Sciences  
Cogswell Building  
Helena, Montana

Members of the Air Quality Board:

Five years ago when the first news stories began to appear about the resurgence of the use of coal in Montana, I began to study strip mining and its impact on land and people. It was at that time that I became aware of a 1965 study on Appalachia by the U. S. Dept. of the Interior, and a corresponding publication on Surface Mining. Everything I read then spelled "bad news", and everything that has transpired since spells more "bad news".

At first I was concerned chiefly about reclamation of land after the mining. One needed only to be aware of what had happened, and is yet happening, in other parts of the U. S., to know that the similar destruction of productive land in Montana was unthinkable.

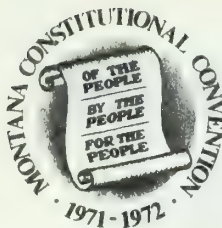
However, other factors even more unthinkable are the ultimate pollution to our air and water. Montana cannot be anything but the loser under present circumstances.

I hope that hundreds of letters reach your office. However, after investigation, and now knowing what you know about the grim possibilities for our environment, it would be your solemn responsibility as a duly constituted body concerned with the welfare of the citizens of this state, to take action regardless of whether or not you receive one single letter from any citizen.

I am enclosing a copy of a speech I have given recently to various organizations, and am also enclosing copies of statements I made at hearings during the Constitutional Convention, and on the floor of Convention Hall a few months ago in Helena.

If these statements were valid then, they are more so now. In my files are dozens of letters from Montanans who pleaded for a strong environmental plank. I would be glad to forward copies of them if you so wish. It is interesting to note that some of the things I fought very hard for are now being recommended by the Environmental Quality Council.

Since then, many more individuals have become aware of the threat to our environment, more groups have begun to organize to



# MONTANA CONSTITUTIONAL CONVENTION

STATE CAPITOL • HELENA, MONTANA 59601 • TELEPHONE 406/449-3750

LOUISE CROSS  
Delegate, District 3  
Chairman:  
Natural Resources and  
Agriculture Committee

protect themselves from the coal companies, the power companies, the railroad, and even some individuals who see only the short term gain.

What individual would have the effrontery to deliberately circumvent the requirements of the Montana Environmental Policy Act and expect to get away with it? Why should the Montana Power Company?

Sincerely yours,

*Louise Cross*

Louise Cross

RECEIVED

NOV 21 1972

COMMENTS ON COALSTRIP POWER PLANT IMPACT STATEMENT SCIENCES  
Division

There appear to be a number of serious inadequacies in the draft statement. The meteorological conditions which were used for the calculation of the 3-hour and 24-hour averages were not stated. The 1-hour average appears to be a fumigation condition which would be expected to produce concentrations of about the reported level. The 3-hour and 24-hour averages appear to have been drawn from 1-hour averages through division by factors of 3 and 24 respectively. Such factors would be appropriate for extending the 1-hour averages to the longer periods for fumigation conditions. However, it is likely that the fumigation condition does not produce the highest levels for these longer periods. The experience of the TVA authorities has shown that the maximum longer term concentrations are usually associated with limited mixing conditions and that the maximum 24-hour average may exceed 23% of the maximum 1-hour average.<sup>1</sup> Further, for a plant with this stack height they expect the maximum concentrations (1 hour) for fumigation and limited mixing to be about the same, thus the 24-hour levels would be expected to be about 0.10 ppm under the assumption that the fumigation conditions are representative of actual values.<sup>2</sup>

Second, high terrain is mentioned, but no topographic map is presented. This does not allow the reader to estimate what concentrations may occur when the plume is trapped in a stable layer which interacts with plume-height terrain. The 4400-foot terrain to the south would be at plume height. Under very stable conditions with low wind speeds sulfur dioxide concentrations of 0.7 ppm (1-hour average) would be expected. This illustrates the importance of terrain effects.

The levels of flourides reported in the coal are very low. For example, the lowest levels reported are about 40 ppm or ten times the level reported here.<sup>3</sup> Typical levels for coal average 130 ppm.<sup>4</sup> A report of an anomalously low value, such as this one, should be accompanied by some description of the sample preparation and probably an analysis by another laboratory. This is particularly important for flourides, because the data suggest that flourides tend not to be captured in the scrubbers and may be easily lost during sample preparation. In this aspect flourides are very similar to mercury and it appears that Truesdale Lab reported low values in that case also. If the flourides actually averaged 130 ppm in the coal, the emissions would be as much as 2300 pounds per day.

Another inadequacy is the lack of data on other trace elements such as selenium, phosphorous and arsenic, all of which are similar to mercury and flourides in that they are more likely to escape particulate collection than other trace elements.<sup>5</sup>

The mercury emissions should also be discussed in terms of their effects on the aquatic environment. It appears that a single ton of mercury can pollute a stream flow of about 4 million acre feet. A level of .17 ppb in water appears to be capable of producing levels in the flesh of fish of .5 ppm.<sup>6</sup> This latter figure is above acceptable levels for human consumption on a regular basis.

Furthermore, emission of 5.5 pounds of mercury per day would be slightly above the emission levels permitted for chlor alkali plants. It is true that scrubbers may be able to collect some of the mercury, although it is clear that other particulate collection devices are

rather ineffective and poor collection efficiency (5% or less) should be assumed until higher ones have been demonstrated.

The adequacy of the secondary standards is subject to considerable question. For example, the secondary particulate standard of  $60 \mu\text{g}/\text{m}^3$  would be expected to permit average visible ranges of no more than 12.5 miles. Thus, at least to the extent that people value vistas of objects more than 13 miles distant, the standards do not protect against all adverse effects. It was considerations similar to this one which led New Mexico to ask that the non-degradation decision of the district court be upheld. Furthermore, the criteria documents point to synergistic effects of sulfur oxides and oxides of nitrogen on plants at levels below the secondary standards.<sup>7</sup> These levels could occur near the coalstrip plant.

Another difficulty with the statement is that the test method used to determine the particulate collection efficiency is not stated. I suspect that the ASME method is used, in which case the actual particulate emission may be understated by a factor of three or more.<sup>8</sup>

The last inadequacy relates to the discussion of visibility reductions. The conclusion does not seem to be adequately founded, although the phraseology is sufficiently vague to preclude a precise understanding of the conclusion. Small sources of particulates such as wood waste burners, gypsum plants and perlite mills produce considerable visibility degradation. Compared to these, the plant will be a large source, and, furthermore, the particulates which escape the scrubbers will be of a very small size and consequently will have a much greater impact on visibility per unit mass. These questions

need not be left in these vague terms. Plume concentrations of fly ash and particulate sulfate may be estimated so that a picture of the plume's effect on visibility under different meteorologic conditions can be presented. Such calculations should be for plume centerline concentrations rather than ground level values.

One last alternative should be mentioned: that of burning gasified coal. The emissions from the plant and the associated gasification facilities would probably be low enough to meet non-degradation requirements.

There is perhaps one problem with the overall construction of the document. The only calculations presented are described as conservative, and in my opinion underestimate the probable impact. Furthermore, the impact is described as impossible to predict quantitatively. While there is an element of truth in this statement, I believe our present knowledge could be used to make "current best estimate" predictions which would be useful. Visibility restrictions associated with the plume would be a natural candidate for such predictions as would be plume impingement on high terrain.

Michael D. Williams  
Michael D. Williams, PhD.

1. T. L. Montgomery, "Comments For the CPEAC Panel Discussion -- The Cumulative Effects of the Power Plant Network on or Near the Colorado", Tennessee Valley Authority, Muscle Shoals, Alabama; Sept. 2, 1971.
2. Carpenter, S. B., et al., "Principal Plume Dispersion Models TVA Power Plants", Paper #70-149 presented at the 63rd Annual Meeting of the Air Pollution Control Association; June, 1970.
3. Statement of John Wright (New Mexico Environmental Improvement Agency) before the Senate Interior and Insular Affairs Committee during

hearings on "Problems of Electrical Power Production in the Southwest", Albuquerque, N.M.; May 24, 1971.

4. Southwest Energy Study -- Coal Resources Work Group; October, 1971.
5. Same as above.
6. Lambou, Victor, "Report on the Problem of Mercury Emissions into the Environment of the United States", presented to the Working Party on Mercury, Sector Group on Unintended Occurrence of Chemicals in the Environment, OECD, Jan. 27, 1972; p. 53.
7. U.S. Dept. of HEW, "Air Quality Criteria for Sulfur Oxides", NAPCA No. AP-50, January, 1969; p. 5-13.
8. "Abatement of Particulate Emissions from Stationary Sources", National Academy of Engineering -- National Research Council, COPAC-5, July, 1972; p. 34.

November 21, 1972

4053-A Sycamore Ave.  
Los Alamos, New Mexico 87544



# STATE OF MONTANA



U. S. DEPARTMENT OF

INTERIOR

1972

## FISH AND GAME

ENVIRONMENTAL SCIENCES  
DIVISION

Helena, Montana 59601  
November 17, 1972

Dr. John Anderson, Director  
Department of Health and Environmental Sciences  
Helena, Montana 59601

Dear Dr. Anderson:

As requested, we have reviewed your draft statement regarding the environmental impact of the proposed Montana Power Company electrical generating plant at Colstrip, Montana. We will attempt to categorize our comments on the report for easier reference. Before doing so, however, two general comments are in order. First, on practically every page of the statement the lack of information on effects of this development, the mining of coal, the power plant itself, reclamation, power lines and water needs appears obvious. Nevertheless, the development is continuing without regard for these question marks. Secondly, we believe a comparison is in order to clearly identify those individuals and natural systems of Montana that must absorb the adverse effects of this development for comparison with the benefits claimed, along with identification of where and to whom those power production benefits will accrue.

In regard to the "Description of Proposed Action" segment of the report, we have the following questions and comments:

This section discusses mine-mouth plants in Montana and states that in the past, power plants were generally located near load centers and the coal imported over long distances. The reasons for locating the plants in Montana is not specifically discussed. The report does state, "these mine-mouth plants are favored by environmental parameters, at least from the owner's standpoint." This statement definitely needs explanation as to what these environmental parameters specifically are. It is inconceivable that we can afford to sacrifice Montana's quality environment for the benefit of urban areas in the midwest and west coast areas. It would seem appropriate that those areas benefitting from cheap electrical energy should be made aware of the total cost of that energy by enduring the environmental degradation that attends its production.

The discussion on pipe line and water supply in this section fails to adequately discuss the effects of the pipe line on the terrain over which it is to be constructed, on the river where some type of diversion structure must be located, and on the aquatic ecosystem downstream from the diversion, particularly during times of low flows in the Yellowstone. Absolutely no data other than the quantity of the diversion is presented on this topic. Also notable by its absence is the discussion regarding the alternative of dry draft cooling towers.

The transmission lines discussion fails to adequately discuss the environmental effects of those structures, and again omits discussion of alternative power transmission techniques. It is also noted that the transmission line discussion terminates north of Billings, even though the purpose of the project is to produce power for consumption in the Puget Sound marketing area.

In regard to the "Probable Impact on the Environment" section, we have the following comments:

In discussing the impact of the various emissions -  $\text{SO}_2$ ,  $\text{NO}_x$ , trace elements, mercury, fluorides and other radio active elements - the words "not known," "unknown," "very little is known," "no background information" and "results are preliminary" appear quite often, and emphasize the fact that this entire development, like the reclamation attempts, is putting the cart before the horse. A more logical approach would be to determine these effects elsewhere prior to development in Montana. This statement merely discusses the types of contaminants anticipated from the plant and emphasizes our lack of knowledge regarding their impact. Once again the discussion does not place the proposed plant in the perspective of total Fort Union coal region development.

As with the previous section, the effects of water and heat emissions from the power plant and the effects on visibility and aesthetics merely stress the lack of knowledge and emphasize the need to answer these questions prior to development.

Within this section background levels of sulphur dioxides are discussed. It is noted in the report that they appear to be higher than those suggested by the Environmental Protection Agency.

In noting the location of the sampling stations, it appears possible the open fires occurring for some time at the Peabody Mine may be influencing the data. Has this possibility been investigated?

In the discussion within this section of the effects on the ecosystem, we note the word "natural" which is used in reference to "an ecosystem containing species that have adapted to that particular environment and exist there because of that environment, not in spite of it." The terminology "natural ecosystem" needs clarification. Ecosystems that are immune from the impact of man are sometimes thought of as natural ecosystems, and they probably do not exist anywhere on this earth, with the possible and still questionable exception of the north and south poles and some uninhabited regions. Man's activities, in fact his mere presence, institute changes in the ecosystem. The ecosystem at and around Colstrip is obviously not without man's influence.

The white man has been there for the past hundred years, and prior to that the Indian affected the system. Plants and animals now present in that area are adapted to that ecosystem, their presence and abundance having evolved with man's activities - in this case, primarily agricultural land use dependent upon cattle and/or sheep grazing. With this in mind one can only marvel at the complexity of the ecosystem at Colstrip. For the present at least, any statements regarding the effects on the system are merely conjecture.

Again the wording of this section includes "impossible to predict," "maybe," etc., and merely emphasizes our lack of knowledge.

Within this section is also contained a discussion of special environmental studies. Once again we are conducting studies after construction decisions and plant sitings have been decided. To adequately study the impact of this kind of development, investigations should be begun many years prior to development. Once again we were forced to travel the same road as we have traveled on so many other environmental problems. Another example of this was our involvement with sagebrush eradication in this state. We lost in excess of 300,000 acres of sagebrush wildlife habitat in Montana before any studies were initiated to determine the effects of such eradication. Once again we are involved in what could simply be monitoring of a bad situation.

On the topic of the listing of special studies, it is impossible to evaluate their worth without reviewing the study outlines and obtaining some indication of the commitment of resources to these studies. Study titles tell us very little, if anything at all. We would appreciate the above information to assist us in our continuing evaluation.

We also noted with interest the participant's environmental policy statement which was printed in this section presently being discussed. Item No. 8 of that policy states, "work harmoniously with all local, state and federal agencies and groups responsible for the protection of our environment." Policy statements mean little unless they are backed by a commitment that is real.

An example of the company's intention, I believe, can be derived from an effort made by this Department in 1969 to initiate a study that would have produced the background information so obvious now by its absence. At that time Western Energy, the wholly owned subsidiary of the Montana Power, declined to enter into a cooperative study with this Department that would have cost them less than \$1,000 per year. This fact should be considered when statements of policy are being evaluated. Three years of background data would have eliminated many of the unknowns so evident in this entire statement.

Again within this section in the discussion of ash and water discharge to the land, we note the words, "appear to be," "maybe," and "may result." On page 28 the statement is made, "without an expression of concern from the persons interested in maintaining some of the present land use in eastern Montana, the proposed Colstrip plant may be only the first of many industrial developments that could conceivably alter the land use of most of the Fort Union region." It appears to us that the "expression of concern" has in fact occurred, and is overwhelming. The question is, will this concern be reflected when the time comes to consider permits authorizing construction of projects causing the concern.

When discussing the impact on flora and fauna within this section, it is stated that the emissions from the generating facility will put a stress on some plants which may kill them or reduce their ability to compete with other species. Once again it is obvious we are proceeding with both facility construction and reclamation research without adequate knowledge regarding the plant species with which we are working. It is conceivable that reclamation is proceeding with plants sensitive to sulphur oxides and doomed to failure for that reason. This is just another example of the paucity of information available for discussing a problem of this magnitude.

In the discussion of the impact on the human environment, there are several items we would like to see discussed in greater detail. One is the value of undegraded natural environments as they affect the wellbeing of people, and the other is the impact an expanding human population, and in turn an expanding hunter population will have on already strained landowner-sportsmen relationships.

In regard to the "Adverse Environmental Effect Which Cannot be Avoided Should the Proposed be Implemented," we have the following comments and suggestions:

Under Item No. 2 of your list, we believe it should be acknowledged that the consumption of  $4.2 \times 10^9$  gallons of water can be avoided. The installation of dry draft cooling towers would certainly reduce this consumption and would most likely be in the best interest of all other Montana water users, including those persons interested in maintaining healthy aquatic ecosystems. We also believe this list should be expanded to include: No. 9 - Under present reclamation procedures, decreased wildlife habitat and populations. No. 10 - Decrease in recreational opportunities provided by wildlife and undeveloped land. No. 11 - Reduction in what Montana is famous for - notably open space, a modest human population and an excellent fish and wildlife resource.

In regard to the section entitled "Alternatives to the Proposed Action," the report reiterates our lack of knowledge concerning other energy sources and our unwillingness to force serious consideration of alternatives - not only to

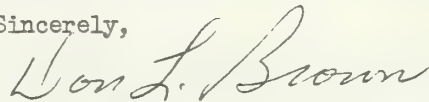
November 17, 1972

the development itself, but also to features of the development. An example of this is our unwillingness to discuss dry draft cooling towers versus wet cooling and other specific water-related project features such as offstream storage of water near the plant site to prevent depletion of the Yellowstone River during periods of low flow. Under any circumstance, the 8,000 gallon per minute diversion of water must be considered in the perspective of the ultimate projected development of the Fort Union coal field and not as if it were the only generating plant to be constructed. We all know this is only the first.

In closing, we certainly thank you for the opportunity to comment, and we hope our comments will lead to a more realistic appraisal of the impact of the power plants in question. You can be assured the Montana Fish and Game Department will do everything in its power to assist your Department in making these impact assessments.

Incidentally, at the most recent Fish and Game Commission meeting our Commission instructed us to immediately increase our effort on the coal fields, and as a result we are assigning an additional man to the Decker-Birney-Colstrip region so that our ability to provide information in this area will be improved shortly.

Sincerely,



DON L. BROWN  
STATE FISH AND GAME DIRECTOR

DLB/sd

cc: Montana Fish and Game Commission  
Regional Coordinators





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NOV 28 1972

ROCKY MOUNTAIN CENTER ON ENVIRONMENTAL SCIENCES

4260 East Evans Avenue • Denver, Colorado 80222 • 303/757-5439

November 27, 1972

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Mr. Don Holtz, Chief  
Air Quality Bureau, Environmental  
Sciences Division  
State Department of Health and  
Environmental Sciences  
Helena, Montana 59601

Dear Mr. Holtz:

Re: Environmental Impact Statement on the Colstrip, Montana  
Power Company Plant

Enclosed are our comments on the Draft Environmental Statement. We appreciate the opportunity to review and comment on this. We also compliment the Department for an excellent overall Draft Statement.

I also enclose two documents as relevant to the case at hand. One is on alternatives in energy; I distributed it originally to the League of Women Voters' State Convention, Great Falls, May 1972. The second is entitled "Wanted: A Better Approach to Energy Planning." It is a critique of the North Central Power Study and recommendations for future planning, by ROMCOE. We feel that the Colstrip plant is deficient in the planning methodologies which we advocate.

Sincerely yours,

ROCKY MOUNTAIN CENTER ON ENVIRONMENT

Albert G. Melcher, P.E.  
Director of Technical Services

AGM:dbm

cc: Fletcher Newby

Enclosures

ROCKY MOUNTAIN CENTER ON ENVIRONMENT  
4260 East Evans Avenue  
Denver, Colorado 80222  
303-757-5439

November 27, 1972

Comments on  
Montana Department of Health and Environmental Sciences  
Draft Environmental Impact Statement on the  
Proposed Montana Power Company  
Electrical Generating Plant at Colstrip, Montana.

I. General Comments

The impact statement is unusual in that it seriously addresses the long-term implications of such a development, and in its conclusion that "the long-term adverse effects may well outweigh the short-term gains." (p. iii) This conclusion is perhaps the most important statement in the document.

The Colstrip plant project raises the problem of additive effects: the proposed plant is the first of several (or many) that will probably be built in the area in the near future. There do not seem to be adequate legal or institutional mechanisms either on a state or federal level to consider the additive effects until we are several steps further down the road. Ideally, the presently proposed plant should be evaluated not only as a separate phenomenon, but also as part of the overall picture. Clearly, the environmental impact of one plant may be "acceptable"; and the entire complex probably will not be acceptable. But, since one plant is a part of the whole, the decision to build, modify, or not to build one plant should not be made in a vacuum. The impact statement cannot justifiably be faulted on this point. We mention this problem to indicate that our evaluative procedures are not yet adequate to handle it. We face the danger of considering each increment of development separately and never evaluating the eventual aggregation of increments.

The preparation of this statement should have involved experts from more disciplines. Certain portions of the analysis are weak; biota, aesthetics and noise are several such sections. The statement concludes that stack emissions will cause the most significant impact (p.11) of the various parameters. This is probably true in this case, but it must be pointed out that a more comprehensive and rigorous study would justify this assumption beyond question or argument. It would also lead to more precise definition of the impacts from emissions. Studies now underway will be of considerable help (p. 24).

However, the absence of a complete range of disciplines probably results in a conservative estimate of the impacts in this case. In other words, it is probable that some adverse effects are undiscovered and hence total impacts could be worse than those portrayed.

There is an unevenness in the treatment of the various components of the entire facility. The power plant receives most attention; less attention is devoted to the mine and to urbanization, and even less is given to the transmission line and water consumption. Even if there are differences in legal jurisdiction

over the various components of the project, the obvious interdependencies of mine, plant, water and transmission lines would seem enough reason for the Statement to consider the impacts of all of these.

The Statement seems to confuse the importance of quantities of emissions with that of *environmental impact*. The former is really only a means for determining the latter. The latter is the real subject matter for a statement such as this. Unfortunately, this statement stresses quantities of emissions. What we really need to know is, what is the *effect* of the emissions? In some cases, the impact is not entirely known (for example, "The potential for damage to the ecosystem by fluorides from the proposed Colstrip plant is not known at this time. At 77 lbs./day, more than 800,000 lbs. may be emitted over the 30-year life of the plant. . . ." (p.19)), but the responsibility of the authors is to define *impact* insofar as possible. "Effects on Ecosystem" (of air emissions) occupies only  $\frac{1}{2}$  a page, and contains little information. It does, however, caution that "over a period of years, the pollutants may build up to levels that seriously disrupt the ecosystem." (p.22) Clearly the subject matter under this heading should have occupied a major part of the statement. Although the authors are correct that exact impacts cannot be defined at this time, there is a good deal of information available as to the nature of expected impacts. In a later section, *some* of this information is discussed. (p. 29)

We feel that the final Environmental Impact Statement, and subsequent ones, should seek to define environmental impacts more precisely, and to focus on them.

The Statement would be improved with graphics showing physiography and ecosystems of the area, and other environmental parameters.

The current court interpretations that the 1970 Clean Air Act is to be construed by EPA to require non-degradation of existing air quality have not been discussed or dealt with in this Draft Environmental Impact Statement. This policy could have a significant effect on all proposed plants in the area, and should be considered seriously.

The impact statement should make clear the status of the project at the present time. From reading only this document, one would assume that the decision to build had not yet been made. However, we understand that the project is under construction.

It would also be useful to answer some procedural questions: what role will and should the impact statement and the Montana Environmental Quality Council play in the project? Is there any further decision-making procedure to be completed which might change the course of action now under way? In other words, is the project to be re-evaluated?

This Draft Statement is one of the more forthright which we have encountered. It is better than most which are prepared by the Federal government. The Montana Department of Health and Environmental Sciences is to be commended for this Statement.

## II. Specific Comments

- A. P. ii, Cutting Plant Load to Meet Standards. It is stated that "Reduction of plant load when these meteorological conditions arise could prevent the high one-hour levels" (of ambient sulfur oxides). Will such reduction be possible, or mandatory, so that "could" can be replaced by "will"? Furthermore is it possible to anticipate the meteorological conditions far enough in advance so that standards will not be violated?
- B. P. 5, Particulate Size. It should be noted that the particulate emissions will be primarily in the range of 2 microns and smaller. These are most damaging to animal health, and remain in the air for prolonged periods. They act synergistically with SO<sub>2</sub> in the atmosphere, in effects on visibility, and in lungs, although precise effects are not known. This should also have been discussed in pages 12-19.
- C. P. 12, Standards. It is stated that only in rare cases will either state or federal ambient air standards be violated. This bears further explanation -- how "rare," and is it legal to violate standards ever?

The impact statement refers to a statement by the Administrator of EPA to document the assertion that ambient air standards "are considered adequate." The Statement, to be complete, should mention that biologists (and others) consider the standards to be inadequate -- see, for example, the EPA and the BSWF Work Group reports to the Southwest Energy Study. The seriousness of this concern is emphasized by the fact that EPA is considering more rigid standards. It has been shown that emissions within the limitations of federal standards do significant damage to vegetation, hence to the entire food chain. See also our comment on non-degradation policy, in "General Comments."

- D. P. 17, Potential Inaccuracies in Diffusion Modeling. It is stated that "wind channeling, impingement and other real-life phenomena" might cause higher SO<sub>2</sub> concentrations than predicted in the diffusion models. It is indicated that the same thing might prove true for other emission parameters. In view of the fact that the estimate that standards would be violated only in "rare" cases (p. 12) was obtained by diffusion modeling, and that charts in the Statement (pp. 9, 10) show that some expected emissions fall barely within standards, inaccuracies due to "real-life phenomena" could prove to be extremely significant. The Statement should emphasize this problem. The implication is that violations of standards are expected.
- E. P. 21-22, Visibility. This section does not indicate if there is any physiographic "pocket" and inversion potential which could cause an accumulation of emissions over a period of time without dispersion. The implication of the comments on modeling is that this would not occur. The Statement should be more specific. The effects of any reduction in visibility should be related to a landscape analysis, including scenic vistas, visual corridors, etc.

- F. P. 22, "Effects on Ecosystem." The "triggering" effects of certain actions could be significant. If vegetative species are reduced in any way, wind and water erosion could be triggered, especially in any extreme weather cycle such as drought.
- G. P. 24, Studies Underway. It is noted that the Company intends to do a number of studies to assess the impact of their operation, and to save any endangered species or archeological materials on their sites. It would seem that the appropriate time to conduct these studies -- before construction -- is past. At least they should be conducted before operation of the plant. The Statement should review the status and findings of any studies underway.
- H. P. 27, "Land Use." The impacted acreages of land use greatly exceed the direct acreage in many ways. For example, in aesthetics, the acreage affected is a "line-of-sight" area from which the mine, plant and transmission line can be seen. This is subject to rational analysis; the Forest Service has a computer program to determine "seen areas." If migratory patterns of some species of wildlife are involved, the effect on habitat of a road, mine or plant may involve many times the direct acreage of the plant.

The long-range possibility of changing the region from an agricultural to an industrial society also represents a land use effect far larger than the acreage directly affected.

The last paragraph on this page includes the sentence "Whether this is good or bad depends upon whether you are a golfer or a hunter." This misses the essence of environmental analysis very badly. Regardless of whether one is a golfer, a hunter or neither, a golf course which significantly disrupts ecological processes is not good; if it could have been located elsewhere with less environmental impact, it is less than good.

- I. P. 29, Aquatic Ecosystems. Paragraph 4: Information on flows of the Yellowstone River should be furnished. An attempt should be made to define more thoroughly the impact of the project on aquatic ecosystems and on water resources.
- J. P. 32, Noise. We disagree that quantitative values are meaningless. EPA and HUD have developed planning guidelines for noise using quantitative values. The workers' environment (plant and mine) includes probable exposure to certain decibel levels for certain periods of time. Will this lead to any loss of hearing? Other questions about noise can be quantified.
- K. Pp. 34-36, Alternatives. The "alternatives" section does not really address the fact that the power from the Colstrip plant is headed for distant load centers, and that many potential alternatives could be taken at these distant points. For example, coal-fired plants could be built at the load centers instead of in Colstrip. The alternative "Not to Construct" should be expanded to include the alternative "Not to Construct in Colstrip." In addition, the alternative of energy conservation -- in its many forms -- has not been mentioned.

Alternatives of Advanced Power Cycles (or "combined power cycles," using gas and steam turbines) are not discussed, despite advantages in efficiencies and emission controls.

We note with interest that wind was formerly used in Montana to provide DC power. This source should be re-examined for modern use.

- J. Pp. 37-40, Long-term vs. Short-term. The section on short-term uses provides excellent perspective. It presents the important long-term questions which so frequently are ignored in favor of the crisis of the moment. These four pages are worthy of separate publication and wide distribution -- the Colstrip plant is only a small part of the issues it addresses. Unless society -- the public, the decision-makers, the utility companies -- faces these far-reaching questions, it will have no basis for evaluating incremental short-term decisions such as the proposed plant at Colstrip.

# um student environmental research center

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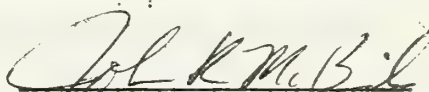
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ENVIRONMENTAL SCIENCES  
DIVISION

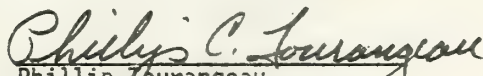
In the matter of the Draft Environmental Impact  
Statement on the proposed Montana Power Company  
Electrical Generating Plant at Colstrip, Montana

Before: Air Quality Bureau, Montana State Department  
of Health and Environmental Sciences

Submitted by the Student Environmental Research Center

  
John McBride

  
William Tomlinson

  
Phillip Tourangeau

On review of the draft environmental impact statement, prepared for the two (2), 350 MW coal fired units of the steam electric generating plant presently being constructed at Colstrip, we find the statement generally inadequate, being insufficient, both in scope and depth to enable definition and quantification of impact. After detailed study of the draft statement we believe that the following questions should be considered in the final impact statement, and further that consideration of these questions is required under Section 69-6504 of the Montana Environmental Policy Act.

Administrative

What was the date declared for commencement of construction by applicant Montana Power on their application for a construction and operating permit?

What was the date of department receipt of application for construction permit as required under section 2 of Regulation 90-001 entitled Air Pollution Control Construction and Operating Permits?

Section I (A) (1)

It is stated that "this complex...will provide electricity for Montana users and for shipment to the load centers of the Pacific Northwest." Of this power supply what percent will be utilized in state? What percent will be consumed in the Pacific Northwest load centers? (please itemize)

Is this plant required under projected levels of growth for Montana?

It is stated in the impact statement that, "Mine-mouth" plants, which are located near enough to the coal for conveyor or short-distance rail transfer of coal, are presently favored by economic, technical, and environmental parameters, at least from the owners' standpoint." How and to what degree are "mine-mouth" plants favored over load center development employing either fossil fuel based generation, nuclear or other alternative energy conversion technology?

How will the venturi scrubbers remove gaseous fluorides and heavy metals?  
(Cite evidence)

#### Section I(A) 2

What is the applicant Montana Power Company's water appropriation claim at Nichols?

What percent of the minimum flow and average flow of the Yellowstone at the point of withdrawal is Montana Power's appropriation?

What percent of the appropriation is represented by the stated withdrawal of 8000 gallons per minute?

What percent of the minimum flow and average flow of the Yellowstone at the point of withdrawal is this?

What is the maximum capacity of the proposed water supply system? (Both the 24 inch pipe and larger pipes up to 60 inches)

What will be the impact on down stream water quality by the withdrawal of the 8,000 gallons per minute as proposed herein?

What will be the impact on the down stream water quality by the withdrawal of the entire Montana Power appropriation?

An 8,000 gallon per minute flow will deliver 13,058 acre feet of water per year. According to the flow diagram appended to section I, the water consumption of the two (2) units will be 13,068 acre feet per year. Assuming a 26-inch per year evaporation rate approximately 65 acre feet per year will be evaporated from the surge pond. Thus the water supply to the Colstrip generating facility as described is inadequate. Please comment. (Give a detailed water balance from intake through generation, cooling tower and settling ponds.)

What are the operating characteristics of the water supply system? (Size of pump, exact diameter of pipe, number of pumping stations, etc.)

What will be the environmental impacts associated with the construction and continued maintenance of this pipeline?

How will the area disturbed by the construction of the pipeline and pumping stations be reclaimed?

Has right of way acquisition begun for the pipeline?

Will the pipeline cross any sections of state or federal land?

If the answer to the preceeding question is affirmative have the easements for these parcels of land been obtained?

Does the applicant expect to exercise the powers of condemnation in securing pipeline right of way?

#### Section I (A) (3)

What are the environmental impacts of the powerlines associated with the generation complex?

Section I (A) (4)

What precautions will be undertaken to control particulate air pollution from the crushed coal stockpiles?

What percent of the mined land will be reclaimed each year?

Will additional lands, not presently held by the Western Energy Co. be required for their expanded mining operation required under this proposal?

Section I (A) (5)

What is the physiographic setting of the power plant and requisite facilities?

(On suitable topographic maps or air photos locate the two (2) thermal electric generators, cooling towers, aquaduct, pumping stations, transmission lines, settling or ash ponds, surge ponds, coal storage areas, strip mines, haul roads, and housing developments.)

What are the qualifications of Ron R. White and Company?

Of the total cost of the Colstrip facility what will be the cost of the abatement equipment? (Include cost description of all abatement equipment.)

Section II (A)

The sandstone caprocks are considered by many to be one of the most outstanding topographic features of the Colstrip area. What are the unique landscape features of the Colstrip area?

Section II (B)

Please clarify what is meant by the Tongue River Indian Reservation?

Section II (D)

Have archeology surveys been conducted on the steam generator site, mine site and the site of all requisite facilities?

What percent of power generated will be lost in transmission to the Billings substation and to west coast load centers?

Will the ozone generated by the powerlines react synergistically with sulfur dioxide from the power plant to create an air pollution problem?

What route is to be selected for the two additional 230 KV powerlines that will be constructed?

Will the two (2) additional transmission lines cross any state or federal land?

Has right of way acquisition begun for the two additional powerlines?

Does the applicant expect to exercise the powers of condemnation in securing transmission line right of way?

On what date did construction commence on the transmission line currently under construction?

Has all the right of way been secured for the transmission line currently under construction?

Does the transmission line currently under construction cross any state or federal land?

If the answer to the preceeding question is affirmative have the easements for these parcels of land been obtained?

Has the applicant exercised the powers of condemnation in securing any portion of right of way for the transmission line under construction?

What effect will the increased travel on unpaved streets, mining and construction have on particulate levels in the town of Colstrip?

What is the basis for the statement, "It is anticipated then that an annual geometric mean for the area may approach 50-60 ug/m<sup>3</sup>?

### Section III (A) (3)

What is the accuracy of the sulfation plate method for determining SO<sub>2</sub>?

How can the predicted Annual Average SO<sub>2</sub> concentration after the power plant is built be less than present background levels?

Please detail and document the computer diffusion model used to predict pollution levels by the State and EPA. (Perhaps this could best be done by including the entire model and input data)

Can particulate and NO<sub>x</sub> values be determined from the SO<sub>2</sub> model?

Have baseline studies been conducted to determine the particle size and number density in the ambient air? What are the results?

What will the particle size and number density be in the stack gases?

What influence will these particles have on the base line conditions?

### Section III (A) (5)

How can the environmental impacts of trace elements be assessed without a comprehensive statistically significant elemental analysis of the coal?

We are particularly concerned with the fluoride concentration reported by Truesdale Labs. Analyses from the Southwest Energy Study

If the answer to the above question is affirmative please describe the location and contents of all finds?

### Section II (F)

The statement made on page 8, titled Meteorology can only be considered a climatic description of the area. The following Meteorologic parameters are necessary to evaluate air pollution potential and to provide baseline data for climatic modification, resulting from the development.

- Mean annual and monthly temperature and precepitation
- Wind speed and wind direction both at ground level and for the upper atmosphere
- Standard deviation for both wind speed and wind direction for both ground level and upper atmosphere
- Annual and monthly average relative humidity at standard observation times
- Inversion frequency and duration as evidenced by temperature differential at varying elevations and barometric pressures
- Solar radiation
- Visibility and cloud ceiling

### Section III (A) (1)

The aquaduct, transmission lines and surge ponds also have primary impacts on the environment.

### Section III (A) (2)

How was the estimate of  $15 \text{ ug/m}^3$  total suspended particulate derived?

What are the present particulate levels in the town of Colstrip?

indicate levels much higher as do preliminary analysis on Montana coal at the University of Montana. As vegetation is particularly sensitive to fluoride levels, an accurate analysis must be made.

What are the qualifications of Truesdale Labs?

How are uranium and thorium removed from the effluent gases?

### Section III (A) (6)

Explain paragraph one (1).

What effect will water vapor and heat emissions have on relative humidity, fog incidence, cloud ceiling and incoming solar radiation?

What effect will the localized heat island associated with the power plant have on the surrounding ecosystem?

### Section III (A) (7)

We cannot agree with the first sentence following the quotation from the First Annual Report of the Council On Environmental Quality.

Relative humidity near the power plant will be high and will probably be near 100 percent during the winter months. Under these conditions visibility reduction will definitely take place. The initial contention is also contradicted by the last sentence of the paragraph, "It is possible that under meteorological conditions such as high humidity a marked increase in fog occurrence will be observed due to the water emission."

### Section III (A) (8)

There are numerous studies on the effects of SO<sub>2</sub>, NO<sub>x</sub>, particulates, etc. on ecosystems. It is certainly possible to predict some of

the effects of these pollutants. We can only stress that this section should be greatly expanded and should include a review of the pertinent literature on the effects of these pollutants.

### Section III (B)

What is the past record of the designated contractors in meeting their guarantees on boiler and emission control facilities?

### Section III (C)

What facilities are employed by West Associates in performing trace metal coal analysis? (What specific chemical and physical determinations are employed?)

Does the public have access to the special Environmental Studies performed by the applicant and subcontractors?

Does the public have access to all monitoring data collected by the company?

How will endangered species and archaeological materials be saved for posterity?

### Section III (D) (1) (a)

What methods of dust suppression will be employed in the handling and storage of flyash?

### Section III (D) (1) (b)

Has the effect of boron in the flyash been appraised?

What solubility studies have been performed on the flyash?

### Section III (D) (1) (c)

What studies have been undertaken to determine ground water contamination from flyash and settling pond leaching?

### Section III (D) (1) (d)

The discussion of sewage treatment seems to be quite sketchy and numerous questions arise. (Please give a detailed description of proposed sewage facilities and particularly what sewage treatment facilities will be available for the construction work force.)

Please include in the discussion on the Colstrip sewage system the "Water Quality Management Interim Plan for Colstrip, Montana" as prepared by the department and the grant application and granting stipulation for the funding of that system under EPA.

### Section III (D) (4)

Explain pages 29 - 31.

### Section IV

The following are also adverse environmental effects which cannot be avoided should the proposed facility be implemented:

1. New road construction and the upgrading of existing roads.
2. If the proposed facility just meets ambient air standards further industrial development will be precluded.

### Section V

The discussion of alternatives is inadequate. The impact of non development must be considered and additionally the alternative choices for the proposed facility should be considered. (i.e. wet versus dry

cooling towers, de-ashing coal, desulfurization of coal, advanced  
SO<sub>2</sub> emission controls, etc.)

The discussion of alternative technologies should be greatly expanded  
particularly in reference to why each choice was eliminated.

## Comment Recipients

Fletcher E. Newby  
Environmental Quality Council

Frank Culver  
Governor's Task Force on Coal Development

Ellen Withers, Chairman  
Northern Plains Resources Council

Board Members  
Montana Board of Health

John A. Green  
Environmental Protection Agency

Thomas Judge  
Governor Elect

Ernst R. Habicht, Jr.  
Environmental Defense Fund

Glenn Paulson  
Natural Resources Defense Council

Carl Anderson  
Montana Power Company



UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

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P. O. Box 970, Bozeman, Montana 59715

November 30, 1972

Don Holtz, Chief  
Air Quality Bureau  
Environmental Services Division  
State Department of Health and  
Environmental Sciences  
Helena, Montana 59601

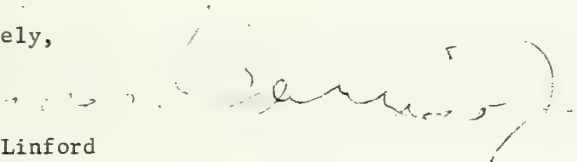
NOV 30 1972  
ENVIRONMENTAL SCIENCES  
DIVISION

Dear Mr. Holtz:

The draft environmental statement for the proposed Colstrip Power Plant in Rosebud County was reviewed by the Soil Conservation Service.

Our staff offers no comments on the draft statement.

Sincerely,

  
A. B. Linford  
State Conservationist







UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE

Post Office Box 1296  
Billings, Montana 59103

RECEIVED  
DECEMBER 4, 1972

December 4, 1972

Mr. Don Holtz, Chief  
Air Quality Bureau  
Environmental Sciences Division  
State Department of Health and Environmental Sciences  
Helena, Montana 59601

Dear Mr. Holtz:

Thank you for the opportunity to review the draft "Environmental Impact Statement on the Proposed Montana Power Company Electrical Generating Plant at Colstrip, Montana", dated October 1972.

We offer the following comment for possible inclusion in your report:

Page IV. Pipeline. The size of the pipeline (diameter) should be shown since it is a critical factor in estimating the many unknowns associated with possible effects of the development. If it is only 24 inches diameter as shown as the minimum, it can be assumed that this environmental impact statement reflects the needs of this 700 mw plant. If, however, the diameter is to be 60 inches as reported likely (Billings Gazette, 12/1/72), we are compelled to conclude that the ultimate development associated with the construction and development in this vicinity will be many times greater, perhaps nine times greater.

The effects upon the river fishery of a diversion of the magnitudes herein considered is not likely to be significantly detrimental. However, intake structures should be screened or so designed as to preclude entrance of fish now in the Yellowstone River.

Water Consumption. It is much more meaningful to people (in the West, at least) to show water volumes or rates of flow in terms of acre feet (af) or cubic feet per second (cfs). Thus, we suggest that the 8,000 gallons per minute be shown as 17.8 cfs, and 12,816 af per year.

Page 2. Pipeline and Water Supply. Comments immediately above are applicable here and this paragraph should be revised accordingly. It would be appropriate to suggest that the surge pond be constructed so that 30 percent or more is over 15 feet deep. This would then have potential

value for fish and fishing. Its value for this purpose may hinge on other factors ie., rate of water change, problems associated with screening intakes and outlets, and fish management (fish planting, rough fish control, and regulation of fishing).

Page 2. Transmission Lines. All power lines should be so designed and constructed that they will not present an electrocution hazard to raptors or other birds.

River crossings are particularly dangerous to waterfowl that move up and down stream, particularly during migration periods.

Page 8. E. Recreation. This paragraph ought to be headed Recreation, Fish and Wildlife. We suggest that it be written as follows - "South-eastern Montana offers limited opportunities for outdoor recreation. Campgrounds have been established in the Custer National Forest and on the Indian Reservations, but opportunities for boating, sailing and swimming are few, and winter sports and other organized activities such as golf, hiking, nature study, and summer group camp activities are scarce. However, all of these are available in some measure within 200 miles west.

The pronghorn antelope and mule deer provide excellent big game hunting of national importance to residents and non-residents. Whitetailed deer are common along major watercourses and are hunted in proportion to their limited numbers. Some of the State's best ring-necked pheasant populations are found along the Yellowstone River, and particularly in the nearby side drainages. Hungarian partridge, sage grouse, and sharptailed grouse are common and where habitat is suitable provide a moderate amount of hunting, however, almost none of it by non-residents. A fair fishery for walleye pike and sanger is provided by the Yellowstone River and major tributaries. Trout are seldom caught below Billings on the Yellowstone River or Hardin on the Bighorn River. A few trout are to be found in farm ponds having adequate depth and other conditions favoring cooler water temperatures. There is an important paddlefish population in the Yellowstone River below Forsyth and fishing for this species has increased greatly in the past ten years."

Page 14. 2. Particulate. The second paragraph top page 14, should be strengthened. We are concerned that dust from the mining operations, including the trucking of the coal to the plant site, along with the particulate matter from the plant, will be deposited on vegetation over a wide area. Prevailing winds will be instrumental in carrying this dust. Vegetation coated by dust and particulates will either die or at least be unpalatable to both livestock and wildlife.

Page 14. 3. Sulfur Oxides. Sulfur oxide emissions of 6,820 per hour from furnace stacks of the proposed project is a serious threat to the

existing environment and additional efforts should be made to improve emission control more than the 39 percent proposed.

Page 20. 6. Effects of Water and Heat Emission from the Power Plant. The bottom paragraph would be much more meaningful if the water volume and rate were conventionally expressed. We suggest the "3,300,000 pounds per hour" be revised to say "395,000 gallons per hour (14.7 cfs) or 10,600 acre feet per year". The above comments apply to the top paragraph on page 26 as well. (Note our related comment for pages IV and 2.)

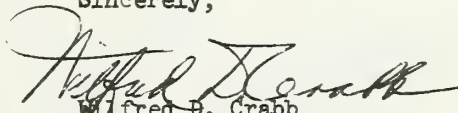
We feel very confident that discharges to the atmosphere in this magnitude at relatively low levels will result in very significant climatic changes in the direction of prevailing air currents. The individual impact of this primary unit (of 700 mw) may not be significant, but cumulatively with prospective full development precipitation may be very substantial. Erosion problems in nearby drainage ways may be accelerated and the effects upon both fish and wildlife habitats could be significant. Some of the effects might be expected to be beneficial, others could be detrimental unless measures are taken to offset them.

Page 29. 3. Impact on Flora and Fauna. We do not agree that " . . . hunters, dogs and so on will have a damaging effect . . ." Although there may be some increase in hunting pressure, the take of deer and antelope, the primary species of concern, is carefully managed by hunting areas and excessive use can and probably will be avoided. We suggest deletion of all of the first sentence of the second full paragraph on page 29.

This section should discuss plans to offset damage to the flora and fauna, in particular, the details concerning land reclamation. Among other things, land reclamation should include consideration for the construction of fish ponds, or reservoirs suitable for future management for public fishing by the Montana Fish and Game Department.

We believe that steam electric power generation stations based on the coal deposits in Eastern Montana should not be constructed until a better total evaluation of their potential impact on the environment can be made.

Sincerely,

  
Wilfred D. Crabb  
Acting Area Manager



UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE

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DEC 27 1972

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DEC 26 1972

ENVIRONMENTAL SCIENCES  
DIVISION

Mr. Don Holtz  
Chief, Air Quality Bureau  
State of Montana Department of Health and  
Environmental Sciences  
Helena, MT 59601



Dear Mr. Holtz:

Your draft Environmental Impact Statement for the proposed Colstrip Power Plant has been reviewed by this office.

The following is a consortium of views expressed by individuals having expertise in a wide variety of disciplines. The greatest concern expressed by these people does not relate specifically to your Environmental Impact Statement, but is one which identifies the need for a more comprehensive study to assure orderly development and the production of needed power from the entire Fort Union Formation Area in a manner which will prevent or minimize degradation to the environment, traditional uses and human resources of the area affected.

We believe that an approval for construction and operation of the first two relatively small facilities discussed in your Environmental Impact Statement would act as a precedent setting action for additional plants in the area. An analysis of the cumulative effects of the ultimate amount of mining, number and size of plants is needed before piecemeal development is undertaken.

Although the first two plants proposed for the Colstrip area are large when compared with existing electrical generation facilities in Montana, they represent a very minor portion of the possible number and size of plants now being considered for the utilization of coal in the Fort Union Formation. The North Central Power Study, as an example, proposes development up to 53,000 MW in the area. The 53,000 MW capacity is 75 times as great as the first two plants proposed by Montana Power.

The first two plants at Colstrip propose the construction of a 30-mile aqueduct from the Yellowstone River and two additional powerlines to the Billings area. If there are to be additional plants in the area, a more comprehensive analysis should be made to determine if larger

capacity aqueducts and power transmission lines would be more economical and create less total adverse environmental and social effect and impact. The preferred location of these lines needs to be identified along with alternates in order to adequately evaluate their impacts.

Your Environmental Impact Statement points out that Montana Power is presently considering additional units at the Colstrip location. It is our understanding that two more plants are being planned for completion by September 1978 and 1979, respectively. Each of these plants would equal the total generation capacity of the two plants discussed in your Environmental Impact Study. Information made available to us indicates that 350 MW of the 700 MW to be produced from the first two proposed plants at Colstrip would be wheeled to the West Coast. This same material shows that an additional 1,050 MW would go west from the second two plants being planned by Montana Power and Puget Sound Power and Light. Thus far, we have been unable to determine where the balance of available power will be directed. We are anxious to find this out since it is possible that transmission lines might be planned which would cross National Forest lands east of Colstrip.

The environmental statement indicates "the rapid growth of electrical energy consumption in the United States at this time is an indication of our dependence on this commodity." "This demand is presently growing in such manner that consumption doubles every ten years."

Estimates of future electrical power loads in the Pacific Northwest is estimated to double about every 12 years. The Pacific Northwest region in order to meet its future power needs will in all probability have to shift its reliance on hydroelectric generation to a system made up of hydroelectric and thermal generation. Major load centers of the Pacific Northwest are located along the Pacific slope with hydro-generation plants located east of the Cascade Mountains. Much of the needed thermal generation may also come from east of the Cascades and also east of the Continental Divide.

The electricity from the Colstrip project as discussed in your Environmental Impact Statement would be transferred by three 230 K.V. transmission lines originating in the plant switch yard and extending westerly to the Billings area. These lines will terminate as a new substation to be added to the Montana Power Company integrated system north of Billings, Montana. There is no evaluation as to the possible transmission line corridors, transmission line capacities, and the environmental impacts involved in moving the needed electricity produced to the Pacific Northwest load centers. In the Pacific Northwest where present peak loads are approaching 20,000 MW, the right-of-way problem can be somewhat reduced by the replacement of existing lines with higher capacity lines. As transmission voltage increases the land use per kilowatt for transmission right-of-way decreases. A 230 K.V. alternating current line carries about 300 MW,

while a 500 K.V. alternating current line carries on the order of 1,250 to 1,500 MW, about five times as much power, yet the 500 K.V. lines require only 125'-150' of right-of-way---slightly more than the 125' for a 230 K.V. line.

It would appear that, should the development of Montana coal become as significant as is presently committed by the environmental statement for the Colstrip project, power transmission corridors will be needed across the Continental Divide to reach the Pacific Northwest load centers and especially the coastal area of the region. Western transmission of generation from Colstrip to the load centers involved could involve several existing and potential transmission corridor possibilities. These possibilities are directly related to major existing and proposed transmission grid systems and known power marketing responsibilities. Some prominent transmission line corridor considerations are:

1. Colstrip, Montana, west to Anaconda, Montana, westerly across the Sapphire Range and Bitterroot Mountains via the Magruder Corridor to south of Lewiston, Idaho, westerly to the load centers.
2. From Anaconda, Montana, to Hot Springs, Montana, to Spokane, Washington; Grand Coulee, Washington, south and west to load centers.
3. From Anaconda, Montana, to Hot Springs, Montana, following the present Dworshak Hot Springs Transmission Line to west of Dworshak Dam near Ahsahka, Idaho, via the lower Snake River area to the load centers.

The above possible transmission line corridors could involve directly and indirectly National Forest system lands located on eight National Forests.

In considering the above or other possible existing or potential transmission line corridors where National Forest system lands are involved, there are land and resource management considerations involved which must be solved and alternatives considered before final decisions and authorizations can be made. Comprehensive land and resource evaluations and analysis processes must be completed to ascertain that the proposed transmission line corridor(s) is consistent with other planned activities and would not create any foreseeable serious adverse consequences concerning long term management. Determination must be made that the portion of the considered corridor located on intermingled or adjacent land would not adversely and seriously offset important National Forest system values or preclude the achieving of National Forest objectives. Also, determination must be made that the proposed corridor location on National Forest system lands would not adversely or seriously affect the environmental quality of other intermingled or adjacent land. Also included are primitive area studies, social and economic impacts, pending legislative action, environmental statements required by the National Environmental Policy Act, public involvement, coordination between all

utilities including public, private, and Federal agencies involved in the production transmission and marketing of electricity. Until the above is accomplished and all alternatives considered, all land options related to the allocation National Forest lands from a diminishing land base must be kept open. Determination of locations and authorization for transmission line corridor (s) on National Forest land such as discussed above would require approximately 5 years.

National Forest lands nearest to the proposed Colstrip plants lie approximately 20 to 25 miles to the east. The prevailing westerly winds passing through the Colstrip area also pass over the Ashland Division of the Custer National Forest. We are, therefore, concerned about stack emissions from the proposed plants.

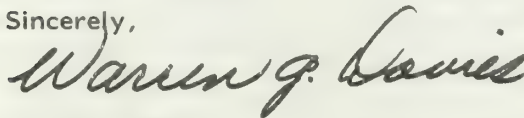
The projection for uncontrolled emissions of 3.2 pounds per hour of fluorides and 0.23 pounds per hour of mercury are particularly worrisome since they are cumulative poisons and affect plants and animals at relatively low concentrations. Livestock develop fluorosis if grazing is done on vegetation containing more than 35 ppm fluoride.

If the second two plants being planned by Montana Power are constructed and should they produce fluoride emissions at an equal rate, a total of approximately 42 tons per year could be created. The effect of this volume of fluorides on the downwind livestock industry is not known, but would no doubt be significant.

The projected emission of 82 tons per day of sulfur dioxide by the first two small plants would degrade air quality seriously. There is need to identify the amount of sulfurous and sulfuric acids that would be deposited downwind from the plants before construction is permitted. The effects of this large amount of emissions is the important thing to identify. It matters little if the proposed plants individually comply with State and Federal air quality standards based on pounds per million BTU of input.

In summary, I would like to reemphasize the need for comprehensive area-wide study to assure the orderly management of the coal resources within the entire Fort Union Formation to help meet the energy needs of this country in a manner which is in harmony with a quality environment.

Sincerely,

*for*   
STEVE YURICH  
Regional Forester



## DEPARTMENT OF STATE LANDS

STATE CAPITOL

HELENA 59601

(406) 449-2

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ENVIRONMENTAL SCIENCES  
DIVISION

November 22, 1972

STATE BOARD OF  
LAND COMMISSIONERSFORREST H. ANDERSON  
GOVERNORDOLORES COLBURG  
SUPT OF PUBLIC INSTRUCTIONFRANK MURRAY  
SECRETARY OF STATEROBERT L. WOODAHL  
ATTORNEY GENERAL

Mr. Don Holtz, Chief  
Air Quality Bureau  
Environmental Sciences Division  
State Department of Health and Environmental Sciences  
Board of Health Building

Dear Mr. Holtz:

We have reviewed the Draft Environmental Statement for the proposed Montana Power Company Electrical Generating Plant at Colstrip, Montana, and wish to comment thereon.

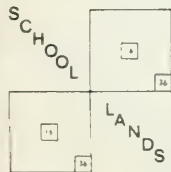
TED SCHWINDEN  
COMMISSIONER

We are concerned over the proposal to bury flyash, bottom ash, and economizer ash in "worked out" strip mines and feel that the discussion of the impact of the proposal (on page 25) is inadequate for the following reasons:

1. A complete analysis of the material and of its trace metal content should be requested before a decision is made concerning burial. Otherwise, any adverse impacts such as ground water contamination might be irreversible before they were discovered.
2. There is no discussion of the affect of fly ash burial on future mining for lower seams and the subsequent reclamation of ash contaminated spoils.
3. There is no discussion of other alternatives. We understand that some generating facilities presently sell this material to cement manufactors for industrial use in cement processing, cinder blocks, etc. This alternative would eliminate any possible adverse effects and would prevent the "wasting" of a portion of Montana's coal resource.

Sincerely,

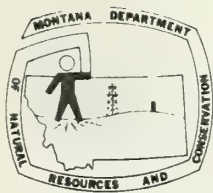
*John Henson*  
John Henson  
Staff Counsel



RESOURCE

FOR THE  
PRESENTAN  
OPPORTUNITYFOR THE  
FUTURE





# MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

FORREST H. ANDERSON, GOVERNOR  
GARY WICKS, DIRECTOR

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449-3647  
SAM W. MITCHELL BUILDING  
HELENA, MONTANA 59601

December 18, 1972

Mr. Don Holtz, Chief  
Air Quality Bureau  
Environmental Sciences Division  
Department of Health and  
Environmental Sciences  
Helena, Montana 59601

**RECEIVED**

DEC 19 1972

ENVIRONMENTAL SCIENCES  
DIVISION

Dear Mr. Holtz:

We have reviewed the draft environmental impact statement for the proposed Colstrip Power Plant and would like to offer the following comments:

1. With regard to possible alternatives nothing was mentioned about alternative plant designs - e.g. different size or type of plant with different water requirements.

In particular we would like to see the final impact statement discuss the advantages and disadvantages of utilizing dry-cooling towers as an alternative to the proposed wet-type cooling towers as a means of disposing of waste heat from the generating plant. Dry-type cooling systems eject waste heat directly to the atmosphere without an evaporative loss of water.

Studies indicate that dry-cooling towers require only one percent of the water that wet-cooling requires; therefore, it may be possible to reduce the consumptive water use of the Colstrip plant if dry-cooling towers are used. ("North Central Power Study", Phase I, Vol. II, pg. XI-13, 1971.)

In addition direct savings to the utility may be possible with dry-cooling. Examples are: (1) reduced fuel cost due to greater flexibility of plant location with the dry-cooling system, (2) possible transmission cost savings as a result of greater flexibility of plant location, and (3) possible savings in cooling-water costs. ("Dry-Type Cooling Towers for Steam Electric Generating Plants," a paper by John P. Rossie, R. W. Beck and Associates, 1971.)

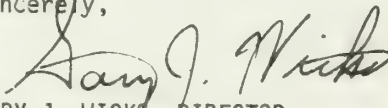
Advantages to the public sector are also apparent and, although presently unquantifiable, are obviously important. Two advantages are: the possible reduction in future water use conflicts between agriculture and the energy industry and the reduction of pressure to build storage reservoirs to provide water for the energy industry.

Mr. Don Holtz  
December 18, 1972  
Page 2

2. The size of the pipeline is not well defined. The statement mentions only a minimum size of 24 inches. The size could be an important factor on total impact.
3. The impact statement indicates that approximately 8,000 gallons per minute from the Yellowstone river will be needed for operation of the plant with no water being returned. Since Montana Power Company filed a notice of appropriation on December 22, 1970 for 250 cu. ft. sec. or 112,200 gal. per minute to be transported to the vicinity of Colstrip by a 60" diameter pipe to be constructed by 1974, does this mean that other plants are being contemplated in addition to the one being built? What does 8,000 gal. per minute or 112,200 gal. per minute from the Yellowstone mean in terms of percent of minimum flow and average flow of the Yellowstone at the point of diversion? What impact would the withdrawal of such quantities of water have on water quality or on the quantity available for downstream users?
4. Other than the statement on page 2 with regard to "common corridors where feasible" for two transmission lines to be built in 1975 and 1976, what considerations have been given to routing of pipelines and transmission lines? Have alternative routes been thoroughly investigated and has a common routing corridor been considered? Has there been consultation with other companies having future plans in the area concerning the possibility of a common aqueduct for water supply? What are the impacts of contemplated pipelines and transmission lines?
5. It appears to us that ash from the plant may have some deleterious soluble compounds. We would be interested in receiving the results of the investigations to be conducted by the Department of Health and the Montana Power Company concerning this potential problem.
6. What class of agricultural land by Soil Conservation Service standards will this plant occupy? Does the 1365 acres proposed for the plant occupy prime agricultural land? Does the proposed plant site location plus supporting facilities and activities represent a planned land use consistent with the needs and desires of the county, southeastern Montana or Montana?

Thank you for the opportunity to comment.

Sincerely,

  
GARY J. WICKS, DIRECTOR  
DEPARTMENT OF NATURAL  
RESOURCES AND CONSERVATION

GJW/nw

cc: Fletcher Newby



# United States Department of the Interior

IN REPLY REFER TO

911: 1792

BUREAU OF LAND MANAGEMENT

STATE OFFICE  
316 NORTH 26TH STREET  
BILLINGS, MONTANA 59101

DEC 20 1972

RECEIVED

DEC 21 1972

ENVIRONMENTAL SCIENCES  
DIVISION

Air Quality Bureau  
Montana State Department of Health  
and Environmental Sciences  
Cogswell Building  
Helena, Montana 59601

Gentlemen:

Our agency has reviewed the draft Environmental Impact Statement prepared by your Department concerning the proposed Montana Power Company electrical generating plant at Colstrip, Montana, and has compiled the following comments:

1. Description of the Proposed Action and Assessment

Considerable detail was developed pertaining to the activities surrounding the plant site and mine location. However, information concerning the three proposed 230 KV transmission lines that will originate at the plant site and cross the state towards the Billings area was very limited. Also, little discussion was focused on the proposed 31 mile aqueduct which will divert 8,000 gallons of water per minute from the Yellowstone River. The impact of the three power lines and the aqueduct should have been fully evaluated in conjunction with the entire project operation to enable an in-depth assessment of the total magnitude of the project as proposed. With this information on hand, a more realistic approach to possible alternatives and the various tradeoffs involved in each alternative could have been developed and assessed.

An incremental assessment and/or licensing approach may preclude full assessment of the entire project and viable alternatives because such an assessment could lack comprehensive information needed at the crucial decision-making stages.

2. Impacts on the Environment

a. Ecological Impacts from Emissions:

It appears that further study of the items listed below are needed to determine both their short term and cumulative effects on the living and non-living components of the environment:

Pollutants - Air

Particulates

Sulfur Oxide

Nitrogen Oxide

Fluorides

Mercury

Other trace and/or radioactive substances

Studies and data would also appear to be needed on the wind flow and climatological patterns in the Colstrip area. Some questions meriting consideration are noted as follows: What areas will be affected by the plant emissions? Will the emissions drift towards Broadus and the Black Hills? Will they drift into the Yellowstone Valley? What effect, if any, will inversion layers have on the stack emissions and the steam which is emanating from the cooling towers?

b. Impacts Other than Emissions

From the draft statement, it was summarized that the project proposal would physically affect the following acreages of land:

Mine	2,000 acres
Plant Site	1,365 acres (maximum)
Rights-of-Way	2,900 acres

The text covered the plant site in considerable detail while the proposed mine field, water pipe line and transmission lines were treated in a more limited fashion.

The design, construction method, and routes of pipe line and transmission line rights-of-way would have been helpful. This discussion should have included such items as right-of-way widths, the type of topography and vegetative cover disturbed, and the measures considered for each affected resource along the primary and alternative routes selected.

One critical factor meriting considerable discussion and not covered in the mine field operation was the potential effect, if any, of strip mining on the area's water bearing aquifers. If adverse effects are possible, or anticipated, what corrective measures, if any, could be taken to safeguard or alleviate the situation? This potential environmental impact could have substantive local and regional effects concerning current and future ground water quality and utilization practices.

### 3. People Influence or Impact

The text discussed this topic but several questions still persist and should be addressed in this type of environmental assessment. In the short run, during the construction phase, 800-900 workers and their families, if any, will be involved in the proposed project. However, during the operational phase, this number will drop to approximately 100 full time employees and their families. How will the local amenities and natural resources be affected by such an influx of population and its inherent characteristics? How will the project affect area housing, public services such as education and law enforcement, professional services such as medical needs, transportation services, and facilities, public administration goals, financing services and planning and overall outdoor oriented public recreation? The short and long term implications and cumulative effects concerning this proposed project and its people influence and impacts are, therefore, of critical importance.

### 4. Impacts on Flora and Fauna


Plant and animal life should have been considered along the various proposed right-of-way routes to supplement the discussion of these factors at the plant and mine site locations. Also, more information concerning the specific vegetative types and wildlife species affected by the proposed project would have been desirable to enable an assessment of the short term and long range effects of the overall development proposal in this relatively remote area of the state.

### 5. Alternatives

Within the alternatives section, an alternative not considered and meriting consideration would have been the locating of the plant site closer to the power demand centers. Although this action would not mitigate the total impacts of the project, it would provide an expanded forum for discussing and weighing the local and regional tradeoffs involved concerning the proposal under consideration.

Thank you for the opportunity to review the draft.

Sincerely,

  
Edwin Zaidlicz  
State Director



# STATE OF MONTANA DEPARTMENT OF INTERGOVERNMENTAL RELATIONS

PLANNING & ECONOMIC DEVELOPMENT DIVISION  
1424 NINTH AVENUE — HELENA, MONTANA 59601  
406-449-2400

FORREST H. ANDERSON  
GOVERNOR

December 8, 1972

Air Quality Bureau  
Montana State Department of Health  
and Environmental Sciences  
Cogswell Building  
Helena, MT 59601

Gentlemen:

Reference is made to the draft Environmental Impact Statement on a proposed Montana Power Company electrical generating plant at Colstrip, Montana. Comments were collected from several members of our staff and have been consolidated and can be summarized as follows:

It is difficult to provide an objective evaluation of the statement without benefit of data furnished by the Montana Power Company in its permit application. However, we concur generally with the statement in its overall evaluation of the probably impact on the environment. As we read Part III of the Statement, the proposed 700 M.W. plant is expected to operate within federal and state standards for emissions and ambient air levels (except for ambient sulphur oxides which may, infrequently, exceed established levels).

We would suggest that an additional alternative to the proposed action concerns building the plant in another area of Montana or in an adjacent state or closer to load centers. It would be useful to evaluate this alternative for the purpose of validating data provided by the sponsor and to determine what the impact of this size plant might be if located in an area where industrialization has already taken place, in terms of the environment and social and economic impacts, etc., or where there are marked differences in climate and meteorological phenomena from that of southeastern Montana. Also, in the final EIS on this proposal, a dichotomy might be developed which would expand the alternative of not building the plant at all - i.e. a moratorium vs. the opportunity to closely monitor the construction and operation of the project under consideration, and use it as a "test bed" to determine if future expansions are feasible at all. This discussion might consider the extend of risk involved in permitting the 700 M.W. plant as setting a precedent for unlimited expansion. Would it be reasonable to support a moratorium now rather than look upon the 700 M.W. plant as a situation which would tell us whether larger and more numerous plants of this type could be tolerated?

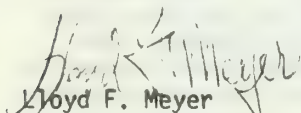
In future draft statements of this type, the Department of Planning and Economic Development and other state agencies should be called upon to contribute to the portions dealing with strengths and weaknesses of the political, social, and economic institutions of the area and the capabilities of those institutions to

absorb impacts expected from the proposed development. We do not see wholly "adverse environmental effects which cannot be avoided" (see Part IV) in population increases of the magnitude (around 2,000) facing Colstrip, for example. Such a facility as this might well provide job opportunities and living standards adequate to retain some of the large numbers of our young people who now leave Montana because there is no future for them in remaining here. Also, if the penalty on the environment is not excessive, we question whether it would be an adverse effect for an increased flow of capital and goods to occur in the vicinity of the plant. Permit these examples to serve to illustrate why we suggest that more inputs perhaps might have been considered.

There are good reasons to raise the larger issue of strip mining in eastern Montana from a long-term view of what extensive coal development portends. But that is a task calling for a different kind of review and a much more comprehensive study and analysis. It requires that the entire spectrum of electrical energy production using strippable coal be examined in the context of the potential and the threat to eastern Montana, the State, and the Nation. Over the long term and under conditions of expansion, there will unquestionably loom grave threats and considerable promise. We would suggest that these disparate conditions cannot be related and compared with finality based merely upon this proposal for a first "mine-mouth" plant. The kind of broad review which addresses the total issue is a main function of the Coal Task Force. It is vital that the Task Force enjoy the positive cooperation by all agencies and that it arrives at well-reasoned conclusions as quickly as possible.

Thank you for the opportunity to review and comment.

Sincerely,

  
Lloyd F. Meyer  
A-95/EIS Coordinator

LFM/rm

cc: Bill Spilker; Bureau of Economic Development  
Department of Natural Resources  
Environmental Quality Council

*Aubrey S. Larson*

- PUBLISHER -

Box 1298  
MILES CITY, MONTANA  
Nov. 25, 1972

State Dept. of Health  
Air Quality Bureau  
Helena, Mont.

Dear Sirs:

I support the construction of a power generating plant at Colstrip by the Montana Power Co. I also support construction of other generating plants as proposed by the company and others.

Montana desperately needs investment money. The Montana Power plant is one example of this type of money. Montana must encourage a climate which encourages development in order for Montana to realize its fair share of plant investment money related to coal mining. Further, Montana must espouse a strong, unequivocal statement supporting coal development and processing. This is an absolute first step if Montana is to realize benefits of her resources and if her people are to realize the benefits of the many jobs that go with it.

The need for more electricity is obvious. The "energy crisis" is a fact. According to a noted economist-writer, Donald Rogers, writing in Economy Report, "there will be a fuel crisis in the Northeast this winter. Natural gas will be in short supply. And electricity will be in short supply." Don't forget, he reminds us, that every major city in the nation's upper latitudes has for four years suffered "brownouts" during the hottest and coldest days. And the shortage is expected to get worse.

We may, as we are inclined to do in Montana, say, what the hell do we care about the northeast part of our country. (One wonders how ~~we~~ we might react to a similar statement directed to US by THEM!) We care because we live in the United States. And if our area happens to have the resources available to help out, by all means we are obligated to ~~so~~ do. But "doing something about an energy crisis" is not easy. It requires vast investment money. It requires new technology. It requires transmission of large quantities of power...and the right kind of power...large quantities of base load power to augment the user requirements of other power companies in different parts of the country. Montana can help fill the bill on all counts by development of her coal resources. Private industry has the capability and the desire to go ahead and fill the need, so why do we tarry and seek a stoppage? In the name of the environment? Bosh!

Pollution efforts will be overcome by the technology of industry. Not by some autocrat sitting in some agency office in Helena or Washington D.C. As Peter Drucker tells us: "...the sewage treatment plants (as an example) that are urgently needed all over the world will be designed, built and kept running not by purity of heart, ballads, or Earth Days but by crews of crew-cut engineers working in very large organizations, whether businesses, research labs or government agencies." We must remember that any pollution is controllable - but at a price. Practically every environmental task demands huge amounts of electrical energy, way beyond anything now available. And

THE CIRCLE BANNER

Circle, Montana

THE POWDER RIVER EXAMINER

Broadus, Montana

THE HYSHAM ECHO

Hysham, Montana

THE JORDAN TRIBUNE

Jordan, Montana

*Aubrey D. Larson*

- PUBLISHER -

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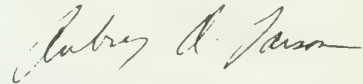
Box 1298  
MILES CITY, MONTANA

why do we indulge in the grossest hypocrisy in this matter. On the one hand we say we are serious about pollution control programs - whether waste, emissions, sewage or pesticides - WHILE WE REFUSE TO BUILD THE POWER PLANTS WE NEED TO RESOLVE THE PROBLEMS. We need to put first things first and generation of electricity is that "first."

In the same newspaper that tells me of the peril of coal development for Eastern Montana is another article, tucked on the bottom of page 20 in small headline package: "Montana's jobless rate continues to climb...by February more than 10% of the state's civilian work force will be unemployed." This is another bit of hypocrisy we can do without. It's time we got serious about the problem of job opportunity in Montana.

The environmental doomsayers have reigned long enough. Now it's time to go to work and solve the problems facing Montana and the nation.

Sincerely,



Aubrey D. Larson, publisher  
Miles City, Montana

THE CIRCLE BANNER  
Circle, Montana

THE POWDER RIVER EXAMINER  
Broadus, Montana

THE HYSHAM ECHO  
Hysam, Montana

THE JORDAN TRIBUNE  
Jordan, Montana

218 Glenwood  
Glendive MT 59330

November 20, 1972

Air Quality Bureau  
State Dept. of Health and Environmental Sciences  
Cogswell Building  
Helena MT 59601

RECEIVED  
NOV 21 1972  
MONTANA DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES  
DIVISION

Dear Sir:

I am becoming increasingly disturbed by the campaigns being waged by some environmentalist groups and the Billings Gazette over strip mining and power production.

Those of us who keep up with the energy situation in this country know that we are headed for a period of energy shortage if positive steps are not taken very soon. I have enclosed a copy of the conclusions drawn in a study conducted by the Chase Manhattan Bank entitled "Outlook for Energy in the United States to 1985." I believe these conclusions sum up our situation very well.

As a result of this energy pinch, Montana is faced with what I believe to be a golden opportunity. We have here an opportunity not only to help alleviate the energy crisis but to bolster our own economy at the same time. I believe that with proper control, by that I mean reasonable pollution limits and realistic strip mining laws, we can all benefit from the orderly harvesting of the coal resources that we have here in Montana.

In the past few years it seems that any time some new idea or situation arises, there are many boistrous shouts against change. Most of these are negative scare tactics and have little basis in fact. I only hope that we are not overcome by such propaganda.

In the case of the Montana Power plant at Coalstrip, I hope that you will grant them a license to operate their proposed plant if they meet the pollution standards now on the books. I feel it is a step in the right direction and should be encouraged by all.

Respectfully yours,

  
Wes Eyer

WE/kls  
encl./



RECEIVED

Missoula, Mt. 59801  
January 22, 1973

State Board of Health  
Capitol Building  
Helena, Mont 59601

CONFERENCES  
DIVISION

Gentlemen:

I am a native Montanan - born in Bonanza in 1915.

I think we cannot run our state with only college professors and retired Californians. With increasing demands from all divisions of government our taxes are getting unbearable. The only way we can alleviate these taxes is to broaden our tax base and to do this we need industry.

I am for a clean environment but I think we have to clean it up with reason. We cannot put the country back in the shape it was in before the white man came unless we give the country back to the Indians and move out.

If we take the stand that we will not export any goods or services from Montana that will cause some impact on our environment we are open to real reprisals. Minnesota could say no iron produced in Minnesota can go to Montana. Michigan could say, no cars produced in our state could go to Montana. Washington could say, no goods coming through our ports can go to Montana and no produce from Montana can go through our ports. Kind of foolish? What is the difference? Why should we refuse to export goods and services and expect other states to export to us?

Please leave politics and hysteria out of your decisions and work for a better Montana.

Yours sincerely,  
R. J. Sterling



Mrs. Norene Sellers  
709½ North 26th St.  
Billings, Montana 59101

Air Quality Bureau  
State Department of Health  
and Environmental Sciences  
Cogswell Building  
Helena, Montana 59601

EN

Gentlemen:

With reference to the Editorial on the front page of the Billings Gazette, I for one, am getting just a little tired of reading about how much damage the Montana Power Co., Decker Coal Co., and all others are doing by strip mining in our state. And how much pollution there will be if we let the Montana Power Co. build this big plant.

The people in the State of Montana want our people to stay and work in Montana, yet they don't want to create any jobs for them. Just how do you expect to create jobs if you try to stop every kind of industry from coming into our state.

And another thing, where do you think you are going to get money from income taxes, if every one leaves our state to find employment. And they are doing it every day. There are not enough jobs for the people now. I have two children that have been trying to find work, with no luck.

I have visited the Colstrip area, and I can not see where the strip mining is doing as much damage as some of these stupid, and I do mean stupid environmentalists claim.

If I were the Montana Power Co., I would shut off the power for the whole state for about three days, and then we would see how fast people would be complaining about not having heat, electric lights, and able to use their electric appliances. I for one, like my electric appliances, and especially my electric automatic washing machine. I do not want to go back to washing my clothes on the board, of which I have done quite a few times in the past. I don't want to cook with wood or coal. You think there is pollution now, just what would it be, if all of us had to go back to cooking with the old coal range and coal heating.

Sincerely,

*Norene Sellers*

Norene Sellers



2811 Poly Drive  
Billings, Montana 59102  
November 27, 1972

Air Quality Bureau  
State Department of Health and  
Environmental Sciences  
Cogswell Building  
Helena, Montana 59601

Re: Construction of coal-burning  
electrical generating plants-  
Colstrip area

Gentlemen:

I am writing this letter because I am extremely concerned about the unbelievably adverse criticism towards the plans by Montana Power Company and Puget Sound Electric to build certain electric generating plants in the Colstrip area.

First of all, I would certainly suggest that you disregard to a great extent the paranoid approach of the Billings Gazette to this problem. The Gazette, in its desire to make news, has consistently refused to present both sides of the picture; and consequently many of us in Billings feel that they are completely abdicating their responsibility as a news reporting service.

However, I, like all interested Montanans, am concerned with the plans of the two power companies to build a steam generating plant. Let me say that I am not in favor of total degradation of the Colstrip area. However, I must further add that I do believe that the plants can be built within the parameters as set forth by the State Department of Health, by the Environmental Protection Agency, and by all other associated state and federal bureaus who have jurisdiction over this type of operation.

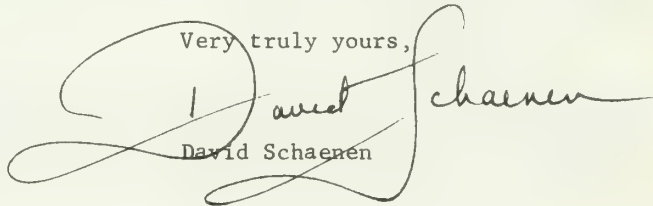
There is, without a doubt, a vital need for the energy which can be produced from the low-sulfur coal currently found in the Colstrip area. Regardless of what politicians may say, there is now an immediate energy crisis, as witnessed by the fact that commencing as early as last winter, certain industrial plants in the Middle West and East were placed on an "interruptable" schedule and some were even shut down because of insufficient fuel, generally in this instance being natural gas.

November 27, 1972

All forms of energy are needed to make our country grow to maintain a viable economy. The American people have become accustomed to a relatively easy standard of living and are using increasing amounts of energy at a very rapid pace. It is going to be necessary that some type of plants be built in this area to generate needed electrical power throughout the United States. The coal in Eastern Montana does not necessarily belong just to us Montanans. The current study being carried on in the Decker-Birney area of approximately 900,000 acres discloses that approximately 80 to 85 per cent of the coal rights in this area are owned by the United States Government. Certainly the State of Montana does not have the power to prohibit the federal government from mining its own coal; and I think that the State should be extremely careful in any laws and regulations which it passes regarding the prohibition of strip mining and its associated activities.

However, I would like to add my voice to the few which I am sure you have received relating to the problem of the construction of the plants as discussed above. I am in favor of the project, but only so long as the plants are built within the regulations and restrictions as set down by the pertinent governmental agencies.

Very truly yours,

A large, stylized handwritten signature in dark ink, appearing to read 'David Schaenen'. The signature is written over the typed name and extends to the right.

David Schaenen

DS:hg



# United States Department of the Interior

OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20240

ER-72/1344

FEB 26 1973

1973  
ENVIRONMENTAL SCIENCES  
DIVISION

Dear Mr. Holtz:

This is in further response to your letter of October 20, 1972, asking for our comments on the Montana State Department of Health and Environmental Sciences' draft environmental impact statement, dated October 1972, on environmental consideration for Colstrip Power Plant, Rosebud County, Montana.

We regret that we were unable to respond to your request for comments within your timeframe due partially to the limited number of copies received with your letter of October 20. To facilitate more comprehensive reviews in the future, we should receive 20 copies of the documents at least 45 days in advance of the review deadline.

## General

We find that the statement provides a good overall view of the environmental impacts of the construction and operation of the proposed project. The section on the Relationship Between Local Short-Term Uses of Man's Environment and Long-Term Effects is a typical example of the sound philosophical discussion woven throughout the statement. However, the statement is grossly lacking in quantification of the impacts.

We suggest that the construction permit include environmental protection provisions. We have enclosed a conformed copy of the Bureau of Reclamation's Huntington Canyon Water Service Contract and the Bureau of Land Management's transmission line right-of-way permit for the Jim Bridger Plant as examples of provisions which could be used with this project.

Figure 1 is referred to on page 4. The flow diagram following page 5 should be labeled "Figure 1." Likewise, the maps of sampling stations in the appendix should be designated Figures 2 and 3, as mentioned on page 19.

A portion of the statement is based on material prepared by the applicant. The appendix should include references to such material by title and date as well as references to other sources of data. Our other detailed comments are presented in the following paragraphs according to the format of the statement or according to specific subjects.

#### Department of the Interior's Jurisdictional Areas

It appears that the transmission line rights-of-way will cross the Crow Indian Reservation and possibly Northern Cheyenne Reservation. Three 230KV transmission lines are proposed, each in a corridor from near Hardin to Billings, Montana. If any element of the total project, including the water pipeline from the Yellowstone River, the transmission lines, or the strip mines, affects public lands or Indian reservations, the statement should clearly point this out on a map and in the text. It should also discuss any permits that are required for these facilities.

#### Northern Great Plains Resource Program

The proposed powerplant lies within the Northern Great Plains area. This area consists of large segments of Montana, Wyoming, North Dakota, and South Dakota which have vast amounts of relatively low sulfur coal and lignite. Extensive interest has developed in the Northern Great Plains' coal resources as the result of national energy needs and increased emphasis on improved air quality. The possibility of substantial development of these coal reserves has resulted in national, regional, and local concern for effective land use and resource utilization, including environmental resources such as mined area reclamation, optimum use of water resources, effects on plant and animal life, and economics.

Private, local, State, and Federal agencies are presently involved in the Northern Great Plains Resource Program. The State of Montana is an active participant. The program objective is to provide an analytical and informative framework for policy and planning decisions and alternatives. We suggest that this study be described in the final environmental statement along with a discussion of the proposed project's conformity to any present or future guidelines.

### Maps

The statement should contain a map showing the general layout of the plant facilities, including the ash slurry ponds and the coal fields. This map should also indicate present and future use of land areas within the project boundary, including the transmission lines. A second map should also be included to indicate the existing and expected land uses of the region expected to be impacted upon by the project. These maps would be valuable assets to the final statement in the identification and quantification of expected environmental impacts.

### Ash Disposal

A large amount of ash will be produced by plant operations in the 30-year projected life of the project. There is an inadequate description of the impact which the ash that is subject to erosive forces will have on the environment in the downstream and downwind area. It is stated on page 2 of the statement that periodically the ash in the ponds will be removed and used as fill in worked-out strip mines. It may be necessary to bury the ash in the stripped mines areas to prevent it from being moved by wind and water rather than simply using it as fill.

Programs to monitor the quality of surface and subsurface discharge from ash disposal areas and settling ponds should be considered in the section on Emission Control and Guarantees.

### Pipeline and Water Supply

This section should provide a better description of the facilities in order that the environmental impacts can be adequately evaluated. Data on type of diversion facilities, pumping requirements, duration of construction period, and right-of-way should be given.

### Transmission Lines

There is little discussion of the transmission line plan except for one paragraph describing three 230 kilovolt lines that will extend from the plant to the Billings area. In recent power system studies, the Montana Power Company has shown additional 230 kilovolt lines from Billings to Great Falls and Anaconda, Montana.

A high voltage transmission line map showing routing of all existing lines and the proposed and alternative transmission lines associated with the Colstrip Plant would be desirable and helpful in evaluating environmental impact. It should indicate the number of miles of new high voltage transmission lines that are involved.

### Geology and Hydrology

This project includes a long-term strip mining operation resulting in considerable disturbance of the bedrock, soils, and topography. The geology and soils of the area and the impact of geologic conditions on all facilities and operations should be discussed in considerable detail in the statement. Much of this data could be provided in illustrative materials and maps. Since the geology and hydrology associated with the project are not adequately described, the impacts of the facilities and operations on the water resources cannot be evaluated.

### Strip Mines

Reclamation of the strip mine area should be discussed. The mining operations will result in considerable changes in the soil. This significant change in addition to being located in a semi-arid climate may present problems in reestablishing a suitable vegetation cover to stabilize soil and slopes. The intent and plans of the utility in regard to the mined areas, standards that apply to strip mining, and monitoring programs should be covered in the statement even though, as indicated on page 3, a separate environmental impact statement will be written on strip mining and necessary reclamation.

### Detailed Description of Process

The third sentence on page 5 is incorrect. The reaction of calcium carbonate and  $\text{SO}_2$  will not result in a solid sodium salt.

We have serious reservations at this time concerning the implication of the last sentence, first paragraph, page 5. Although great strides have been made in the development of  $\text{SO}_2$  removal processes, our latest review of the situation indicated that none of the many different systems being studied have as yet been commercially demonstrated (continuously operated for more than 1 year on a scale of 100MW or larger)

in the United States. Operation of the 22 full-size desulfurization control processes for powerplants, which are in the design, construction, or startup phase in this Country has been intermittent and serious plugging, scaling, and corrosion problems have been reported. Under such circumstances, it is doubtful that any SO<sub>2</sub> control process is yet available whose operability can be guaranteed at any level.

#### Population

The population of Lane Deer consist of 1,341 Northern Cheyenne tribal members and about 2,000 non-Indians. The second paragraph on page 7 should be corrected to indicate this data.

The "Tongue River Indian Reservation" should be changed to "Northern Cheyenne Indian Reservation."

#### Meteorology

We suggest that the amount and distribution of precipitation be added to this section on page 8.

#### Recreation

The excellent recreational opportunities in Southeastern Montana is recognized on page 8; however, neither this section nor the following impact section discusses the cumulative impact of the construction and operation of this plant and future coal-fired plants in the area. A plant-by-plant analysis will not reveal the impact that all of the plants will have on the nearly pristine environment of eastern Montana. Therefore, it is necessary to consider the present proposal in relationship to future developments in order to obtain an accurate assessment of these impacts.

#### Sulfur Oxides

The comments given for the foregoing section on Description of Process also apply to this section beginning on page 14.

#### Trace Elements

The purpose of the last sentence, paragraph 4, page 18, is not clear. This paragraph should relate the concentrations of mercury indicated to acceptable or safe emission levels. If

the venturi scrubber will be used to remove mercury vapor, it should be indicated.

#### Emission Control and Guarantees

Although the procedures to eliminate problems with scrubbers described on page 23 are reasonable from a technical standpoint, the draft statement does not indicate its economic implications. Costs for currently tested SO<sub>2</sub> control systems are \$40-\$70 per kilowatt plus rather high operating costs. The procedure of reducing the boiler load everytime one of the scrubbers is shutdown for cleaning purposes would significantly increase the operating cost and could interfere with the noninterruptible nature of the power by lowering the reliability of the power generation.

#### Plans by Applicant to Maintain Air Quality and Lessen Overall Impacts

According to the list of studies underway and the company's environmental policy given on pages 24 and 25, a significant effort is being made to evaluate and control the impacts of the construction and operation of the plant. It appears that if the information gained from these studies would be incorporated into the final environmental statement that many of our concerns for adequate quantification and description of impacts would be satisfied.

A typical example involves historical values. An indication of the historical value is given on page 8; however, it is also stated that the archeology of the area is not well known. It is stated on page 24 that the University of Montana has an archeological survey underway for the plant site. The available information from this study should be reflected in the section on page 8.

#### Land Use

The general description of the changes in land use is not adequate. According to page 27, the plant will occupy 1,365 acres, the mine will disturb an area of approximately 2,000 acres, and the aqueduct and transmission line will alter approximately 2,900 acres. This significant change in land use should be quantified. The statement should indicate the amount of land transferred to or from crops, forest, recreation, and wildlife. It should indicate the intensity of use and probable use if the project were not built.

### Water Use

The impact of withdrawing up to 8,000gpm of water from the Yellowstone River is not discussed except to indicate on page 29 that aquatic ecosystems will be altered in a number of ways. It appears that these effects will be negligible; however, data should be included to indicate to the reviewer a basis for judging the magnitude of the diversion in relation to historic flows. Also, since there is a possibility that the proposed diversion will interfere with prior water rights, we think that a discussion of augmenting natural flows during dry periods from Mystic Lake Reservoir should be included.

We suggest that the final statement consider the need for irrigation and the possibility of using sewage plant output in revegetation programs.

### Impact on the Community During Construction

It is mentioned on page 32 that haphazard trailer parks and temporary unplanned residential and commercial development could negatively affect air and water quality, aesthetics, and economic and social parameters. This statement is so general that it could be used in any report; however, its value is negligible. This section should indicate the impacts which are expected to occur as a result of the project. General statements are of little value in impact assessment.

Another example of such a general statement is item 6 on page iii. This sentence says that the long-term adverse effects may well outweigh the short-term gains. The writer could just as appropriately have said that the short-term gains may well outweigh the long-term adverse effects. This type of assessment is of little value to the reviewer or the decisionmaker.

### Adverse Environmental Effects Which Cannot be Avoided Should the Proposal be Implemented

Several of the items listed in this section appear to be beneficial environmental effects. The environmental statement can be equally misleading by being too conservative as it can by being too liberal in its assessment of adverse impacts.

Alternatives to the Proposed Action

Many general statements are made in the document that need to be expanded and supported with factual information. For example, it is stated on page 35 in paragraph E that feasibility studies indicate that hydroelectric power could not supply the needed electricity. If such studies are a matter of public record or available for review, the statement should indicate this.

A factual discussion is also needed on the environmental problem and negative aspects mentioned in the first paragraph on page 35.

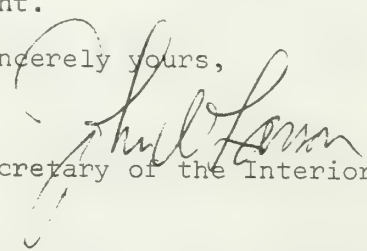
This section should evaluate the environmental impacts of the proposed action in addition to evaluating the economics. It is not necessary to describe these impacts to the same depth that is done for the proposal; however, there should be a general assessment which could be in the form of a comparison of impacts between the proposal and the alternatives.

Irreversible and Irretrievable Commitments of Natural and Economic Resources

A general statement is made in the second paragraph on page 41 that if adequate reclamation is not practiced, the 2,000 acres of land will be permanently degraded. This statement does not indicate whether adequate reclamation will be practiced. At a minimum, the paragraph should indicate the degradation which will remain after programs are completed.

We hope these comments will be useful in the preparation of the final environmental statement.

Sincerely yours,

  
Assistant Secretary of the Interior

Mr. Don Holtz, Chief  
Air Quality Bureau  
Environmental Sciences Division  
State Department of Health and  
Environmental Sciences  
Helena, Montana 59601

Enclosures

Testimony  
Miles City Hearing  
January 5, 1973  
Department of Health and Environmental Sciences  
Subject: Draft: Environmental Impact Statement on the Proposed  
Montana Power Company Electrical Generating Plant at  
Colstrip, Montana October 1972

This impact statement, which is the subject of this hearing, was prepared as a result of the directives contained in the Montana Environmental Policy Act. The Clean Air Act of Montana which regulates air pollutant emissions in this state was passed in 1967; by the later passed Montana Environmental Policy Act, some of the purposes and considerations, as well as the procedures, of the Clean Air Act of Montana were in effect amended and broadened. See Section 69-6507 R. C. M., 1947. The Montana Environmental Policy Act, hereinafter referred to as "MEPA", in its "Declaration of Policy for the Environment" lays down some goals for the administration of the laws of the State of Montana, two of which I particularly wish to call to your attention. They are as follow:

to . . . fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

and

to . . . attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

I wish to emphasize the concept of use without degradation and use without other undesirable and unintended consequences. I find throughout the statement areas where there is such a lack of information that the consequences of the action could certainly be undesirable and unintended.

MEPA directs that an impact statement shall be prepared using an interdisciplinary approach utilizing the natural sciences, social sciences, and environmental design arts, and that prior to making the

statement, the responsible state official, i. e. someone in the Department of Health and Environmental Sciences, shall consult with and obtain the comments of any state agency which has legal jurisdiction or expertise in any environmental impacts involved in the action being considered for the statement. Looking over the list of authors of the draft statement and their qualifications, it would seem that the weight of the expertise involved is heavy in the area of air pollution control, but rather light in other areas of the natural sciences, thin in the area of the "environmental design arts", and non-existent in the areas of the social sciences. There is no indication in the statement that consultation took place with other state agencies as directed by MEPA.

The atmosphere of the statement reflects a rather passive attitude on behalf of the department, a waiting by the department for the permit applicant to furnish hard information upon which the department can base its opinions. My reading of MEPA does not indicate that the role of the department preparing an impact statement is to sit back and wait until the permit applicant furnishes information from which the department can prepare a statement. The impact statement should be an independently prepared document and should indicate some initiative on the part of the agency preparing the document. The statement gives off an aura of insufficient preparation, as though the authors were greatly hurried and may not have had time to sufficiently investigate the situation and obtain source material and documentation. One outside source is cited twice as a reference in the entire document. The statement would be more persuasive and a stronger document, if the sources supporting the authors' opinions were cited with footnotes and bibliography.

The plans and specifications for the air pollution control equipment are very general in the statement, so general in fact, that it is difficult for an expert to make a real assessment of its effectiveness, let alone a struggling member of the public like myself. The regulations of the State Board of Health relating to air pollution control equipment, Regulation No. 90-001, III allow the director to dispense with the requirement that plans and specifications be submitted with the application upon prior written agreement. The technical information on the venturi-type scrubbers to be employed is so general that I wonder if a prior written agreement exists as allowed in the regulations. The name of the contract-bidder does not appear in the statement, which might raise still another question, and that is whether or not the permit applicant has let the bid for the construction of the scrubbers.

It would have been enlightening to have included in the statement the experiences of the Arizona Public Service Company with the wet scrubbers on Units 1-3 of the Four Corners plant and to have also set forth the experience of Kansas Power and Light with using wet scrubbers to control both particulate matter and  $SO_2$ , with the  $SO_2$  control up to a factor of 70% efficient (The Price of Power: Electric Utilities and the Environment, by Komanoff, Miller, and Noyes, published by The Council on Economic Priorities, pp. 17 and 22). It would be useful to have a history of the reliability of venturi-type scrubbers showing in which areas scrubbers of that type are prone to mechanical troubles impairing their efficiency together with a setting forth of the means by which the design specifications of these particular scrubbers will overcome such problems, and if it is the opinion of the department engineers,

both chemical and mechanical, that such problems can be overcome. The efficiencies of the scrubbers depend on the factors of the speed of the flue gases taken together with the size of the solution droplets from the atomizer. In 1968 these matters were somewhat a matter for mathematical calculation rather than practical experience. (Air Pollution, Vol. III, Stern(Editor), Chp. 46, Source Control by Liquid Scrubbing by Seymour Calvert, Academe Press, New York (1968)). Evidence should be advanced in the statement indicating that theory has advanced into effective reality. On page 5 of the statement we are told that there are guarantees on the emission control system. Who is the guarantor, and does the department adjudge the material which forms the basis of the guarantee to be effectively convincing.

Various places in the statement ponds for the disposal of fly ash and the effluent for blow-down and from the scrubbers are mentioned. If the applicant uses soda ash in the scrubber, because sodium is a component, the solutions which will form as a result of its reaction with the flue gases will have a sodium component, and therefore tend to be soluble in water. If there is deposit of this material in fly ash ponds, which will be kept wet to keep down the dust problem, a question arises in my mind as to how much of these sodium compounds would leach out of an unsealed pond and find their way into the groundwater table, increasing its salt content. Calcium compounds are relatively insoluble in water, and would probably have no effect.

Another point in relation to the fly ash ponds is their location. The statement does not set forth an analysis of the chemical composition of the flyash from the Rosebud seam, therefore, it is an unknown factor

other than reference in the statement that it will have an overall alkaline character. It is not stated if the ponds in which the fly ash will be deposited will be seal<sup>d</sup> to keep the mineral content from leaching out into the underground water supply. It would seem that the Korette plant in Billings would have an adequate ash supply from which to obtain an analysis. An alternative plan to sealing the pond with a commercially prepared sealer such as concrete, might be to level and excavate in the old Burlington Northern spoils in the Colstrip area in the spoils areas which are largely composed of gray and blue shale material. These shales have a low permeability to moisture and would probably be nearly as effective as concrete in preventing unwanted mineral leaching.

A certain lack of candour must be imputed to the applicant when one compares the information submitted by the applicant to the Department and information filed elsewhere by the applicant. The statement says that a 24 inch stainless steel pipeline will be used to transport water from the Yellowstone River to the plant, which will be sufficient to serve a 700 MW plant, but in the Rosebud County Court House, the applicant filed a water appropriation for a 60 inch diversion pipe. A 60 inch pipe takes a much bigger hole and results in much more disturbance of the land than a 24 inch pipe. Just the land reclamation problems would be much more severe, because in areas of thin soil, it would take a great deal more blasting of subsurface rock to bury a 60 inch pipe than it would a 24 inch pipe. The question arises as to what are the applicant's intentions with the excess water.

The applicant's intentions are important, because this statement does not consider the additive effects of additional plants. One wonders if the applicant does indeed have plans for additional plants, when the applicant is so long-headed as to appropriate a great deal more water than is required to operate a plant of this size.

An additional area indicating lack of candour is the incomplete information supplied regarding all the new construction of transmission lines in connection with this plant. The statement gives the impression that all new construction will cease at Billings. The applicant did not supply the information that it was involved with Bonneville Power Administration seeking power line routings over the Continental Divide to the Lewiston, Idaho area through Federal lands. This is an additional environmental impact which the applicant apparently chose to withhold from the Department.

There may be some question whether the applicant can clearly appropriate the river water at this time. In 1969 the Montana Water Resources Board filed numerous documents in the Rosebud County Court House appropriating all the water in the Yellowstone River which was unappropriated by any other appropriator at that time. The applicant filed its notice of appropriation in December 1970. The applicant may be unable to begin appropriation steps until the claim of an agency of the State of Montana to the water has expired.

If the applicant proposes to use wooden poles for its high voltage transmission lines, it should be specified that they be proof against the effects of grass and timber fires in the areas through which they pass.

The statement is silent on the nature and chemical analysis of the water from the Yellowstone River which the applicant proposes to use in its plant. If the water from the River is "hard" water, then the applicant will have to soften the water to prevent excessive scale accumulation and increased maintenance costs. If the water must be softened, there are different methods, some of which have undesirable side by-products. Some processes of softening water increase the salt content of the water. This water, if discharged into unsealed ash pond, may in some cases increase the sodium content of soils already sodic. This area should also be examined in the statement.

On page 3 of the statement it is noted that the plant will have a coal storage area, but it is not stated in the statement what proposals have been made to control the dust from the coal storage area and its attendant activities. It should be noted that a strip mine in the Rock Springs, Wyoming area was forced to close because it could not economically control the dust from its operation and storage area in a manner which could meet the National Environmental Policy Act Standards.

It will be interesting to see what effect the large amounts of steam condensation the wet cooling towers will release will have on the area surrounding the plant. It has been found in the Appalachian region that small fogs and icing may be created 1/4 mile away from the plant. (The Price of Power, op. cit. p. 57) It should be noted that the excavation and cement work for the generators of the plant at Colstrip are situate quite close to the paved state highway. It might be possible that wet cooling towers on the plant could increase the accident rate on this road during the winter months. There is nothing in the impact statement indicating the location of the cooling towers in relation to the

state highway. Another question arises in my mind. The new Montana Constitution allows suit against the State. If an accident happened upon the state highway as a result of icing conditions directly attributable to the wet cooling towers excessive production of atmospheric moisture, under the provisions of the New Constitution, would the state be liable for having issued a permit which allowed the construction of such a device in an area where its emissions could constitute a hazard to highway traffic?

There are presently suits pending dealing with the interpretation of the clause in the National Environmental Policy Act relating to the anti-degradation phase of that act. MEPA was modeled after the national act according to MEPA's author, George Darrow. Air sampling has been done in the general Colstrip area. Maps are included in the statement indicating approximately where the samples were taken. I find the information relating to the sample locations quite incomplete. Judging from the map, they were all quite close to a road of some kind. There is no information given concerning elevation, approximate distance from the road, general topography (whether on top of a hill or down in a draw), frequency of traffic on the road, whether the sampler was in someone's yard, by a windmill, or in the middle of the prairie. If the intention was to measure the air quality in areas close to human activity only, it should have been clearly stated in the statement. In addition to traffic on unpaved roads, the wind will some times go down the road stirring up as much dust as a car, but no, or very little dust, will be blowing across the prairie at the same time. I do not think as the samples were taken, judging from the statement, that the Department has informed itself of the quality of the Colstrip area ambient air prior to the operation of the

proposed plant.

It is difficult to believe the statement of page 18, "Thorough, comprehensive sampling for trace elements has not been done on this coal." It seems that surely with all that has been burned at the Korette plant and all that is being shipped East to be burned in Illinois, that someone has not gotten curious about what is in this coal beside carbon and a low rate of sulphur.

Dr. Clarence C. Gordon on December 14, 1972, in sworn testimony stated that he received four samples of coal from the State Department of Health and Environmental Sciences, which that department alleged to be from Colstrip, and that he tested the four samples for flourine content, and found that the F content ranged from 40 ppm to 80 ppm. Dr. Gordon forwarded the samples on to an unnamed laboratory in Seattle, and their analysis concurred with his and not with the information presented in the statement. Assuming 40 ppm (see p. 18, statement) in relation to the 4.2 ppm used as average in the statement to arrive at the 77 lbs. F projected to be released per day, then there is a possibility that rather than releasing 77 lbs. per day, a more nearly correct figure is 770 pounds of F released per day from the plant operations. If the flouride factor is greater than 40 ppm, then it is possible that this plant will be approaching or exceed the 864 pound per day hopeful emission standard set for the Columbia Falls aluminum plant.

On page 19, the following statement appears: "However, it is expected that a large but unknown percentage of the flourides will be removed by the venturi scrubber." This X factor becomes extremely frightening if the amount of flouride to be released is 10 times the

amount anticipated in the statement. Dr. Gordon also stated that flouride pollution had been detected as far as 6 miles away from the Korette plant in Billings. The reason he stopped with six miles was that his study had tested no further away, which did not mean that the pollution did not exist beyond that point. Pines are exceptionally sensitive to elevated flouride levels. For more information on this point, see Dr. Gordon's study of the affects of flouride emissions in the Columbia Falls area.

In Barry Commoner's book, The Closing Circle ( Bantam Books), p. 69, reference to a study is made which studied the relation of NO<sub>2</sub> and tomato plant growth. A dosage of 1ppm reduced plant growth 30%. It brings to mind the question, if prolonged periods of NO<sub>2</sub> emissions, although at prescribed dosages, would significantly reduce the amount of grass cover produced on surrounding lands.

The statement is entirely silent on the possibility of the production of photochemical oxidants as a result of hot weather in the Colstrip area and the plant emissions.

There is a reference in the statement to the "Colstrip airshed". It seems to be in reference to how far the wind will carry the plant emissions before the emissions will become so dispersed that no one will notice them. I think it would be very informative for the public to know how many miles in each direction the Colstrip airshed extends. This would serve to define the area which could expect to have its air somewhat degraded and would give a clearer idea of the impact of the plant.

The statement indicates that most of the SO<sub>2</sub> will drop out of the "clean" stack gases within 1/4 mile from the stacks. Will this SO<sub>2</sub> affect any reclamation experiments currently being carried on by MSU?

There is no information in the statement which would tend to predict the number of days which would have winds over 20 miles per hour, thus causing a different pattern of dispersion of plant emissions and varying from the dispersion pattern of days which would be only moderately windy or still. It might be possible that given the prevailing winds in the area to have a long narrow path of relatively intense effects from the emissions if the prevailing winds are strong enough often enough. (See Whatever Happened to Fresh Air, by Michael Treshou, University of Utah Press, Salt Lake City, 1971, p. 46 et seq.)

Mr. Treshou also has some interesting comments on fine particulate matter or aerosols. His opinion is that tall stacks, wind and diffusion do not remove the polluting emissions, but only disperse, and that particles smaller than  $10^4$  remain suspended almost indefinitely and that those smaller than  $0.1^4$  remain suspended until they find an agent with which they can chemically react.  $SO_2$  and F form solutions in rain and snow and fall as precipitation. On page 51, he states, "In regions where precipitation is sparse, the pollutants may be longer lived." (Treshou, op. cit.) The statement does not effectively discuss the life of the pollutants or give any idea as to where they may ultimately accumulate. The build up of pollutants is obvious in the Billings area over the period of the last 20 years. They are now visible on any clear day hanging over the Yellowstone valley. I think the statement is defective in that no real effort is made to determine the ultimate natural barrier which will intercept the pollutants' natural drift on air currents.

In order to determine the effect which plant emissions will have on parties other than the applicant, whether the effect be on health, society, or economics, it would be worth while to set forth

how much land applicant owns and controls in the area, and how far the radius of applicant's land does extend from the proposed plant site. This would also give an indication of whether the effect from the plant emissions will be borne primarily by the applicant and its employees and subsidiaries, or by other persons who would stand to receive no financial gain from the plant.

Actions by the applicant raise doubts in my mind as to the future plans of the applicant in construction of additional power plants. At present the applicant in the last year has mined 5 million plus tons of coal with an electric shovel having a 24 cubic yard bucket. It is proposed to feed this proposed plant 3 millions tons of coal yearly; therefore, it would seem reasonable that this plant would need a shovel no larger than the current shovel to supply its needs, if an additional shovel is needed. I wonder why then has the applicant sought bids for two electric shovels each having a bucket of 60 cubic yards in capacity, as stated in applicant's July 1972 shareholders' report.

Considering the amount of water sought by the applicant in December 1970, the ordering of two huge shovels presupposing a drastic increase in strip mining activity, it is reasonable to assume that the applicant has other big plans which may well cause additive effects in the Colstrip area and that applicant is probably well along in its progress in their execution.

The applicant has not entered into a tenancy in common agreement with Puget Sound Power and Light (See "Abstract of Agreement", dated October 27, 1972, executed by and between Montana Power Company and Puget Sound Power and Light Company, filed October 31, 1972 at 3:20

P. M. in Book 21, Page 168, in the office of the Clerk and Recorder of Rosebud County at Forsyth, Montana) for the purpose of receiving free financing from Puget Sound Power and Light Company. Apparently the applicant would have use believe that the people of the State of Montana will receive all the power produced from this proposed plant, but I hardly find it creditable that Puget Sound Power and Light would be so generous as to put up money for plant construction, receiving nothing in return. The applicant should have divulged exactly how much benefit the citizens of Montana will actually receive from the plant. Several areas come to mind. How many Montanans will be employed in construction and operation of the plant? How many Montana firms will have contracts to supply the needs of the plant and participate in its construction? How much of the power produced from this plant will be used in Montana for the next 5 to 10 years after the plant begins operation? In light of the ecological areas about which so little appears to be known, factors such as the foregoing would have to be disclosed in order to give any balance at all in favor of the construction of the plant.


There are so many factors on which the statement fails to shed any light. Some of the information may be known only to the applicant and has not been disclosed to the Department. Some of the research information the Department was probably hindered in obtaining through lack of time and funds. With the information set forth in the statement at this point, I think that the opinion that the long-term detriment resulting from the construction of the plant would out weigh its short-term benefits is correct.

I, therefore, commend to the Board and to the Department for their mutual consideration, the following language from the Board's publication entitled "Implementation Plan for Control of Air Pollution in Montana", Section III. Control Strategy, Sub-section C. Non-degradation Clause.:

The following non-degradation clause is to be made a part of this plan under the authority and requirements of the Federal Register, dated April 30, 1971, Section 410.2. c as follows: "The promulgation of national primary and secondary ambient air quality standards shall not be considered in any manner to allow significant deterioration of existing air quality in any portion of the state." In compliance with this directive and as a policy of the State Board of Health of Montana it is hereby declared to be the policy that ambient air whose existing quality is better than the established standards, will be maintained at that high quality unless it has been affirmatively demonstrated to the Department of Health and Environmental Sciences of the State of Montana that a change is justifiable as a result of necessary economic and social development vital to the state. Any industrial, public or private projects or development which would constitute a new source of pollution or increased source of pollution to high quality air will be required to supply the necessary degree of treatment to maintain that high quality of air.

The statement which sets forth the standards and operating performance for the emission control equipment is so indefinite that considered in relation to the foregoing requirement, I do not think anyone can be sure that the applicant can meet the required standard to maintain the Colstrip ambient air quality. I would remind the Board and the Department that such control of emission must be affirmatively demonstrated. I do not think this has been accomplished, and that therefore, the permit should be denied at this time.

Submitted by:



E. P. Withers  
Chairman, Northern Plains Resource Council

ORAL TESTIMONY PRESENTED BY PATRICK SWEENEY AS TRANSCRIBED FROM TAPE RECORDING MACHINE

Ladies and Gentlemen. My name is Patrick Sweeney. I am a native of Montana, from Billings, and a member of the Northern Plains Resource Council. I am a graduate of the University of Montana, Missoula, and am not part of that some percent of young people who wish to leave Montana for employment elsewhere. Instead, I wish to stay in Montana. I plan to stay in the Montana I grew up in. I am not an emotional environmentalist just to mummify Montana and let her die in stagnating economy. I do not wish to turn back the hands of the clock. I'm concerned about people, however, and that's what has led me to Miles City today. I would like to address my comments to one aspect of the draft environmental impact statement--the standards for granting of the Montana Power application.

As stated in the Implementation Plan for Control of Air Pollution in Montana, prepared by the Montana State Department of Health and Environmental Sciences, Division of Environmental Sciences, Bureau of Air Quality, the section entitled 'Standards for Granting Applications, Section A. "The Director shall deny a permit to construct if the applicant does not show that it may be expected to operate without emitting air contaminants in violation of standards and regulations formulated under authority of the Clean Air Act of Montana or will interfere with the attainment or maintenance of any application, applicable national standards, or violate any regulations promulgated by the Administrator, U. S. Environmental Protection Agency, pursuant to the Federal Clean Air Act as amended." Given these standards for granting or denial of the application, there is a non-degradation clause in the Implementation Plan for control of air pollution in Montana. I wish to quote that clause if I may. "The following non-degradation clause is to be made part of this plan under the authority and requirements of the Federal Register, dated April 30, 1971, Section 410 (2)(c) as follows: The promulgation of national primary

and secondary ambient air quality standards shall not be considered in any manner to allow significant deterioration of existing air quality in any portion of the state. In compliance with this directive and as a policy of the State Board of Health of Montana, it is hereby declared to be the policy that ambient air, whose existing quality is better than the established standard, will be maintained at that high quality unless it has been affirmatively demonstrated to the Department of Health and Environmental Sciences and the State of Montana that a change is justifiable as a result of necessary economic and social development vital to the State. Any industrial, public or private projects or development which would constitute a source of pollution or increase a source of pollution to high quality air would be required to comply to necessary degree of treatment to maintain that high quality of air."

Unfortunately, the Department of Health and Environmental Sciences has not addressed itself in any manner in the draft environmental impact statement to the non-degradation clause. I believe that it is important to the Colstrip development because the high quality air in the Colstrip area will be significantly degraded by 700 megawatt coal-fired electrical generating facilities and that the presently proposed pollution abatement equipment for these plants will not "supply the necessary degree of treatment to maintain that high quality of air;" instead, it will significantly deteriorate the air quality. The significant deterioration of existing high quality air by industrial development is now being litigated in federal court. A federal appeals court has already affirmed a lower court decision that EPA was wrong in interpreting the Clean Air Law in such a way as to permit deterioration of existing air quality. Air quality standards or non-degradation standards would apply to relatively clean air with pollution levels below secondary limits established by the federal government. This would most certainly include the Colstrip area. The court decision, in fact, is aimed at areas where any of the six air pollutants,

including sulfur dioxide and particulate matter, currently are below the secondary limits. Thus, a coal-fired power plant planned for the Colstrip area, where the air is relatively pristine at present, must be barred altogether because the best available controls cannot adequately control its pollutants. It has been asserted that prohibitions against air quality deteriorations would be tantamount to barring all industrial and population growth in rural areas. However, in specifying significant deterioration of existing air quality, the courts have left EPA and the state's administrative latitude. That is to say, if there are several proposals that the federal agency might allow levels of five major pollutants, particulates, sulfur dioxide, nitrogen oxide, hydrocarbons, and photochemical oxidants to rise by 10 percent or 5 micrograms per cubic meter, whatever is greater, from existing levels, thus giving some latitude for development of rural areas with high air quality. This would allow for some development, but the level of air quality deterioration would not be such that the high quality air in areas such as Colstrip would be deteriorated to the level of the air quality of Los Angeles or New York City. In a June opinion by the U. S. District Court, Judge John H. Pratt concluded that "Permitting the states to submit plans which allow pollution levels of clean air to rise to the secondary standard levels of pollution is contrary to the legislative policy" of the Clean Air Act. In addition, "the public interest in this case strongly supports legislative policy of clean air and non-degradation of areas in which the clean air exists." Thus, it can be concluded that given the implementation plan for control of air pollution in Montana, the Department of Health and Environmental Sciences has the authority to deny the Montana Power Company's permit to construct the 700 megawatt coal-fired electrical generating facility at Colstrip, Montana, due to violations of the non-degradation clause; that is, the air pollution abatement equipment to be installed at the Colstrip plant will significantly degrade existing ambient air quality whose standards are higher than secondary ambient air

quality standards of the federal government. On these grounds, the permit for construction must be denied.

I would submit for the record of this hearing the following petition to the Department of Health and Environmental Sciences and its some 1,000 old signatures. The petition reads as follows:

"WHEREAS, the State of Montana has adopted as part of its air pollution control regulations, the following statement, the promulgation of national primary and secondary ambient air quality standards shall not be considered in any manner to allow significant deterioration of existing air quality in any portion of the state. In compliance with that Federal directive, the State Board of Health has adopted a directive and policy that ambient air whose quality is better than the standards will be maintained at that high quality unless it has been affirmatively demonstrated that a change is justifiable as a result of "...necessary economic and social development vital to the State." WHEREAS, it is the opinion of the undersigned that the environmental impact of the proposed Colstrip generating plant does not meet the foregoing requirements, and that it would substantially degrade the quality of the ambient air in the Colstrip area, and that it has not been demonstrated that the construction of the plant would provide economic and social development vital to the State of Montana, and that it is probable that such a plant, being the first of a series would create more social and economic problems than it would solve: THEREFORE, it is the opinion of the undersigned that the State Board of Health would deny the permit to construct to Montana Power Company for the construction of a coal-fired electrical generating plant at Colstrip, Montana.

Thank you.



# United States Department of the Interior

BONNEVILLE POWER ADMINISTRATION  
KALISPELL DISTRICT OFFICE  
P.O. Box 758, Kalispell, Montana 59901

In reply refer to: OKK

RECEIVED

March 1, 1973

MAR 2 1973

## ENVIRONMENTAL SCIENCES DIVISION

Mr. Daniel Vichorek  
Technical Writer  
State Department of Health  
& Environmental Sciences  
State of Montana  
Helena, Montana 59601

Dear Mr. Vichorek:

Responding to the question in your February 20 letter, the power output of Libby Dam is included in forecasts of resources available to meet projected power requirements in the Pacific Northwest, which will help alleviate power shortages in Montana.

The electrical loads which the regional cooperative Hydro-Thermal Power Program is attempting to supply includes essentially all loads in Idaho, Washington, Oregon, and Western Montana with the exception of those served by Idaho Power Company, Montana Power Company, and Utah Power and Light Company. Even though the planning is done on a regional basis, the addition of Libby will not change the fact that BPA will be bringing energy into Montana to meet its obligations. Item 10 of my February 1 letter discusses this in some detail.

Obviously, it is not prudent for the entire output of a federal resource project such as Libby to be dedicated to a particular State. More efficient utilization is possible if the Project output is integrated with other projects to meet the needs of a larger coordinated system.

The average firm generating capability of Libby Dam under critical water conditions is 186,000 kilowatts (note the change from incorrect figure of 204,000 in my February 1 letter). January firm peaking capability associated with the first 420,000 kilowatts of installed capacity is 216,000 kilowatts.

Enclosed for your information is our recently-published "Power Outlook". Please let me know if you have additional questions.

Sincerely,

Ronald H. Wilkerson  
District Manager



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## United States Senate

COMMITTEE ON  
GOVERNMENT OPERATIONS  
WASHINGTON, D.C. 20510

JAMES R. CALLOWAY  
CHIEF COUNSEL AND STAFF DIRECTOR

18 January 1973

Mr. Daniel Vichorek  
Technical Writer  
Dept. of Health & Environmental Sciences  
State of Montana  
Helena, Montana 59601

Dear Mr. Vichorek:

I am pleased to respond to your 12 January letter in which you properly challenge the statement that "in general, the most rapidly growing utilities have the highest rate of return".

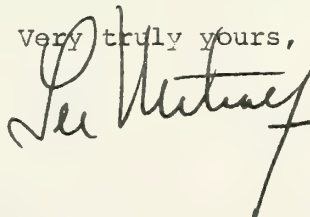
High rate of return is a result of indulgent regulation or non-regulation. The most convenient documentation of the non-correlation between growth and return is the attached table from the 1 January 1973 issue of Forbes.

You can there see that unregulated Texas utilities rank highest in profitability, followed by those in Ohio (the state with the ultra-lenient "reproduction cost new" rate base), Illinois (fair value rate base) and Minnesota (no regulation). By checking the growth column for these same utilities you will see that most of them are below average by that measurement.

By carbon of this letter, I am asking Professor John B. Dicks of the University of Tennessee to send you some of his materials on MHD development in other countries.

The Senate hearings you requested are being sent under separate cover. They are scarce documents, so I may refer others to you, or perhaps you could put them in a Helena library.

Very truly yours,



Enclosure

cc: Professor John B. Dicks



THE UNIVERSITY OF TENNESSEE SPACE INSTITUTE

TULLAHOMA, TENNESSEE 37388

Graduate Education, Research, Postdoctoral Study  
and Continuing Education in the Aerospace Sciences

January 29, 1973

RECEIVED

JAN 31 1973

ENVIRONMENTAL SCIENCES  
DIVISION

Mr. Daniel Vichorek  
Technical Writer  
Department of Health and  
Environmental Sciences  
State of Montana  
Helena, Montana 59601

Dear Mr. Vichorek:

I received a copy of a letter from Senator Metcalf to you dated the 18th of January 1973, along with a copy of your letter to him. Enclosed is an article of mine on the status of MHD power generation in the world that appeared in MECHANICAL ENGINEERING this past spring. Since this article was written, we have heard that the U-25 plant in Moscow has been operating with 5MW of MHD power. This indicates that they are on or ahead of schedule in bringing this technology into use in the Soviet Union. We have been trying to negotiate a program of technical cooperation in MHD with the Soviet Union and were having great success until the recent bombing of North Viet Nam brought a diplomatic coolness on their part in relations with the United States. Hopefully, with the cessation of hostilities in Viet Nam, we can resume negotiations again.

I have the responsibility of coordinating all of the energy programs in the University of Tennessee System and so have obtained some overview of the current energy situation. It appears that coal is the only resource that we have to rely on to fill the gap between the failure of the oil supply and the time near the end of the century when appreciable nuclear fuels can be produced in the breeder reactors.

Mr. Daniel Vichorek  
January 29, 1973  
Page 2

Those of us in the energy field have long been grateful to Senator Metcalf for his intelligent efforts to lead the electrical utilities towards policies that are more nearly in the public interest than they are now. If we can send you further information on power generation, please let us know.

Sincerely,

A handwritten signature in cursive script, reading "John B. Dicks".

John B. Dicks  
Professor of Physics

JBD:eb

Enclosure: (1)

cc: Senator Metcalf



GENERAL OFFICES  
ELECTRIC BUILDING

BUTTE, MONTANA 59701

December 29, 1972

Mr. Don Holtz  
Chief, Air Quality Bureau  
Department of Health and  
Environmental Sciences  
State of Montana  
Helena, Montana 59601

Dear Mr. Holtz:

With reference to our past conversations, I would like to summarize the present status of The Montana Power Company's planned electric transmission and water system portions of the Colstrip project. That project as described in our application to your Department for a Construction Permit to install equipment which may contribute to air pollution and to install air pollution control equipment is two 350 MW generating units. With that generating capacity, the following facilities will be required:

#### Electric Transmission Lines

The partially completed Billings-Hardin-Colstrip 230 kV line will be completed. That line is presently completed from Billings to Hardin, and most of the right of way from Hardin to Colstrip has been secured. This line will be completed in 1973 and will be used to supply power to the Colstrip area until the Colstrip generation is on-line.

In addition to that line, two 230 kV lines from Colstrip to Billings will be required to bring the Colstrip generation into the existing MPCo system. Those lines will be required, one in 1975 and one in 1976. Their route has not yet been detailed, but presently it is assumed that generally they will be north of the Yellowstone River valley and will connect to MPCo's existing system at a new switchyard to be located north of Billings.

The existing MPCo electric transmission system is continually expanding to meet the increasing energy requirements of its customers. Generating capacity introduced into the system at Billings will change the system flow patterns and may change the timing of system additions. Such additions may be influenced by the Colstrip project, but are not an integral part of that project.

Mr. Don Holtz  
December 29, 1972

Page Two -

### Water System

The proposed two 350 MW units will require approximately 8,000 acre-feet/year of water, at rates up to a maximum of 8,000 gpm. The water will come from the Yellowstone River at either Nichols or Forsyth, depending on the pipeline route selected. Two potential routes currently being evaluated are from Nichols up Armells Creek valley, and from Forsyth over the benchland between Armells and Rosebud valleys. The pipeline size will be in the range of 22" - 26" OD, depending on the length of the route selected.

The design of those particular facilities is still flexible, and of course, the best planning maintains the maximum flexibility for as long as possible. The greater the flexibility, the more options remain open so that the final plan will have been adjusted to accommodate the latest technology, including all environmental considerations.

Additional generating capacity at the Colstrip site is a potential change that would affect these facilities. There has been discussion and interest shown by utilities in the northwest for this additional generation. No commitments have been made but the discussions continue. If a commitment is made soon enough, significant economies could be realized by enlarging the initial water pipeline rather than having to install a second line which would also have great environmental advantages. The same would apply to the transmission lines.

Be assured that if changes materialize before a permit is granted, the Department of Health and Environmental Sciences will be notified immediately and a new application submitted for permission to construct any new equipment capable of emitting any contaminants to the atmosphere.

Sincerely,

*Carl R. Anderson*

Carl R. Anderson, Manager  
Environmental Protection Department

CRA:ror

# *The* MONTANA POWER COMPANY

GENERAL OFFICES  
ELECTRIC BUILDING  
BUTTE, MONTANA 59701

March 1, 1973

Air Quality Bureau  
Montana State Department of Health  
and Environmental Sciences  
Cogswell Building  
Helena, MT 59601

ATTENTION: Mr. Don Holtz

Re: Colstrip Units #1 and #2  
Application for a  
Construction Permit

Gentlemen:

The purpose of this letter is to transmit information supplementing our other replies to the several inquiries written by your Mr. Vichorek in the last several weeks and to transmit information we have previously promised.

Attached to this letter are discussions on the following topics that fall into the above categories:

1. Additional Information on the Pollution Control System

All the information on this system developed since our permit application was submitted is presented. The vendor's preliminary design drawings are under review by our consulting engineers but no final dimensions have been developed as yet. When these drawings are finalized, they can be provided if desired.

We have also revised our plant Flow Diagram, Item VII of the permit application, to reflect a design change from bypass air for reheating to a steam supplied plate-coil heater.

2. Pilot Plant Results as of February 28, 1973

The results of the pilot plant program available to date are submitted.

3. Particle Size Distribution

In answer to your request for information, we submit graphs summarizing the available test results. These apply to the Corette Plant precipitator inlet.

4. Fluoride Content of Colstrip Coal

Our statistical analysis of the most recent tests is submitted in support of our conclusion that an average value of 33 ppm, oven dry basis, is appropriate (25 ppm as received).

5. Fluoride Emission Prediction

Using all of the recently developed data, we have revised our estimate of fluoride emissions to a number that is smaller than the one we projected in our formal statement on the draft report.

6. Scrubber Technology

We submit additional discussions of the status of scrubber technology in answer to your requests.

7. Nitrogen Oxide Production

We submit references discussing the available data on nitrogen oxide production in tangentially-fired boilers in answer to your request.

8. Cooling Tower Information

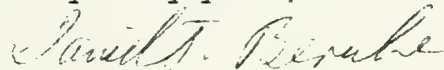
We submit the design information on the cooling towers and information on the considerations that were given on minerals carryover and ice and fog formation in answer to your request.

Air Quality Bureau  
March 1, 1973  
Page 3.....

You should also receive from Professor Super a separate transmittal of the final one-year data summary from the meteorological program. As soon as he has completed them, we will also forward the summary and final reports.

We would welcome the opportunity to discuss these materials with you at your convenience.

Very truly yours,

A handwritten signature in cursive script, reading "David T. Berube".

D. T. Berube  
Supt. of Thermal Generation Engineering

DTB/mje  
Attachments



## SCRUBBER TECHNOLOGY

### Sulfur Dioxide Removal

To supplement our previous statements on the capability of sulfur dioxide removal technology to meet the required performance levels, we attach a copy of the Federal Register of March 21, 1972. In this publication, the Environmental Protection Agency reviews the status of this technology. Nine of the twenty installations listed by EPA have or will use venturi type scrubbers. Rather than rewriting this information, we are enclosing the EPA statement as our statement (Paragraph II.2).

### Particulate Removal

In the area of particulate removal, venturi scrubbers have long been used for high efficiency collection of particulates finer in nature than fly ash. (Refer to various manufacturers' information, such as Research-Cottrell Bulletin RC-975 and Peabody/Lurgi Bulletin 35000.) Numerous applications of scrubbers for particulate control are discussed in the Los Angeles Air Pollution Engineering Manual. A summary is on Page 231. A recent paper (Mathematical Models for Pressure Drop, Particulate Removal, and SO<sub>2</sub> Removal in Venturi, TCA, and Hydro-Filter Scrubbers, M. Epstein, et al, Second International Lime/Limestone Wet Scrubbing Symposium, New Orleans, LA, November 1971) shows that theoretical equations indicate that 99.5% particulate removal can be achieved at gas velocities and liquid to gas ratios that are compatible with the system sulfur dioxide removal requirements. The same paper reports a good correlation between results predicted by the equations and tests run in a venturi type pilot plant.

In addition to the basic venturi stage, the Colstrip design will utilize a stage of counter-current sprays. Although these are intended to insure adequate SO<sub>2</sub> removal, they will provide additional particulate removal. The previous discussion on the pilot plant operations to date showed that particulate outlet loadings below the maximum guaranteed for Colstrip have been demonstrated.

### Fluoride Removal

Numerous articles in the technical literature discuss fluoride removal by venturi scrubbers. A specific article appearing in the March 1958 issue of Industrial and Engineering Chemistry written by K. E. Lunde of the Stanford Research Institute describes the removal of gaseous and particulate fluorides. The concept of the number of transfer units,  $N_T$ , is used to compare various types of control equipment.

When there is a lean gas mixture at a total pressure of about one atmosphere, the number of transfer units is defined as:

$$N_T = \int_{y_1}^{y_2} \frac{dy}{y-y^*}$$

In many installations, there is no vapor pressure or at least an insignificant vapor pressure for the fluoride compound above the liquid, so  $y^* = 0$ . The equation reduces to:

$$N_T = \int_{y_1}^{y_2} dy/y = \ln (y_1/y_2)$$

Where:

$y$  = concentration in gas, mol fraction

$y_1$  = inlet,  $y_2$  = outlet

$y^*$  = vapor pressure above solution, mol fraction

Then:

$$N_T = \text{Number of Transfer Units} = \ln \left( \frac{1}{1 - E/100} \right)$$

A table of  $N_T$  versus  $E$  follows:

<u><math>N_T</math> Transfer Units</u>	<u><math>E</math> Efficiency %</u>
1.61	80
1.90	85
2.078	87.5
2.302	90
2.59	92.5
3.0	95
3.68	97.5
3.9	98
4.61	99
5.3	99.5

The article also states water or a basic solution is used as an absorbent for hydrogen fluoride and silica tetrafluoride. Table 1 on Page 296 of I&EC gives two examples each for counter-current sprays and venturi that use water as the absorbing liquor. The two counter-current sprays give 2.5 to 5.85 transfer units while the venturi exhibits 2.0 to 2.9 transfer units.

The scrubber at Colstrip contains the venturi stages and counter-current flow stage. If the transfer units for both are added where the 2.0 transfer unit value for the venturi is used and 2.58 for the counter-current sprays, then the efficiency is projected to be between 98% and 99% for gaseous fluoride removal.

Stern in Air Pollution, Vol. III, Page 541 states that a jet-venturi scrubber in a super phosphate plant removes 98% of the fluorine in the exhaust gas. This compares favorably with the projection for Colstrip.

Attached is the article by Lunde in I&EC, and the page from Stern - Air Pollution, Vol. III.





# NORTHERN CHEYENNE TRIBE

INCORPORATED

P. O. Box 128

LAME DEER, MONTANA 59048

RECEIVED

1973

ENVIRONMENTAL  
DIVISION

LITTLE WOLF AND MORNING STAR - Out of defeat and exile they led us back to Montana and won our Cheyenne homeland that we will keep forever.



- WOHEHIV - The Morning Star

March 13, 1973

## OFFICERS

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Muddy

Mr. Daniel Vichorek  
Technical Writer  
State Department of Health  
and Environmental Sciences  
Helena, Montana 59601

Dear Mr. Vichorek:

This will acknowledge receipt of your letter of February 22, 1973 concerning the feelings of the Northern Cheyenne people on the coal development now in progress at Colstrip, Montana.

Actually we did not pay too much attention as to what was happening in other areas of Eastern Montana as far as coal development was concerned. We were confronted with our own very serious problems during this period.

We have been quite concerned about the generating plant being constructed by Montana Power Company at Colstrip and I understand that three (3) more such plants will be constructed there at some future date.

We feel that these generating plants will eventually be creating a very serious pollution problem for us and we wonder what effects this pollution is going to have on our other natural resources such as our grass, water and timber.

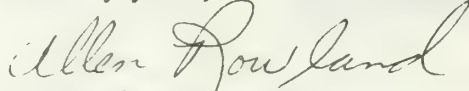
We are also concerned about the very large number of people who have already moved or will be moving into Colstrip and the surrounding area and the effect they will have on our people. We envision large numbers of the people swarming over our reservation roads and recreation areas.

We are not prepared to handle this type of problem at this time, however, we are making an attempt to be ready for any eventually.

We also are very disturbed about the environmental impact statement as far as Montana Power Company's generating plant is concerned. We do not think it was adequately put together and a more meaningful impact statement should be made before the construction permit is issued to Montana Power Company.

I wish to thank you for this opportunity to state our views on Montana Power Company's proposed generating plant. If you need anything further from us please feel free to call or write. I am,

Sincerely yours,

A handwritten signature in cursive script, reading "Allen Rowland". The signature is written in dark ink and is positioned above the printed name and title.

Allen Rowland, President  
Northern Cheyenne Tribal Council

# PUGET SOUND POWER & LIGHT COMPANY

Puget Power Building - (206) Glencourt 4-6363  
BELLEVUE, WASHINGTON  
98009

March 7, 1973

RECEIVED

MAR 14 1973

ENVIRONMENTAL SCIENCES  
DIVISION

Mr. Daniel Vichorek  
Technical Writer  
State of Montana  
State Department of Health and  
Environmental Sciences  
Helena, Montana 59601

Dear Mr. Vichorek:

This is in response to your letters of February 5 and 20, 1973 in which you requested information to be incorporated into the final environmental statement that your agency is compiling for the Colstrip generating plant proposed by Montana Power Company and Puget Power.

1. Why is it necessary to build the plant in Montana, and how will Montana Power achieve any savings?

First of all, it appears from your letters that some clarification of Puget Power's status in the project is appropriate. Montana Power and Puget Power are owners as tenants-in-common of the Colstrip plant. Each is the owner of an undivided one-half interest in the entire project including each of the two 350-megawatt generating units. Each company will receive one-half of the output of the project according to its schedules. Montana Power is not building a plant to sell power to Puget Power. However, we do intend to establish a procedure whereby each utility can use a portion of the other owner's capacity in order to obtain the advantage of diversity in meeting peak loads. In fact, we have already entered into a contract pursuant to which Montana Power will receive a substantial portion of Puget Power's capacity at Colstrip during certain months in 1975 and 1976.

With Puget's interest in the plant at Colstrip being constructed at the same time as Montana Power's, significant construction economies can be realized. The engineer contractor for the project, the Bechtel Corporation, estimated the cost differential between the one-unit project and the two-unit project to be in excess of \$50 per kilowatt.

These construction cost savings represent a significant savings for Montana Power Company and its customers who must ultimately pay these capital costs. It should be noted that Montana Power Company's 350-megawatt plant would have been necessary for its system, and the Company had already begun its plans for Colstrip before Puget decided to join with it in a larger plant.

Since there is currently a net import of electric power to the northeast sector of WSCC, it is essential for system reliability and for system efficiency purposes to construct generation facilities in Montana. Properly balancing the network with added generation at the traditionally weak link of the system, the northeast sector, will improve the reliability of the systems serving that area. In addition, Montana Power will have greater generating reliability because it will own one-half of two units, rather than the whole of one unit, thus facilitating scheduling of maintenance, mitigating the effect of forced outages, and substantially reducing the amount of forced outage reserves that Montana Power must carry. This last item alone represents a substantial savings to Montana Power as its forced outage reserve obligation will be substantially reduced, thus increasing the firm capability of Montana Power's share of the plant.

Since the Colstrip plant will not require new transmission outside the State of Montana, existing transmission systems will be utilized more efficiently. With the only transmission required to be located in Montana, the evidence clearly favors transmission as the alternative to hauling coal to a plant in Western Washington, which was the question posed in your earlier letter. This point is also discussed more fully on Page 5 of Montana Power Company's letter to you dated February 20, 1973.

I trust the above fully answers why the plant is necessary in Montana.

2. Next you ask, "Why is the plant needed at all?" and further request information on Puget Power's load growth.

I am enclosing a copy of Puget Power's 1971 Annual Report, the latest available, which on Pages 18 and 19 presents the financial and statistical record of the Company during a ten-year period, 1961-1971. During this period the annual increase in kilowatt-hour sales has averaged 9.75 per cent, a load increase of over two and one-half times. We are projecting annual increases to average about eight per cent in the next ten-year period as shown on the Table of Loads and Resources furnished to you in Montana Power Company's letters dated January 18 and February 20, copies of which are attached. Puget Power's peak load is projected to increase from an actual system peak load of 2115.2 megawatts in 1972-73 to 4,018 megawatts in 1981-82; and its energy load from 1,210 megawatts in 1972-73 to 2,315 megawatts in 1981-82.

The reasons for this growth are several: growth in number of customers, the primary factor, as well as increased use by each customer. These

facts are borne out by the statistics in the Annual Report. Obviously, people find the Puget Sound area a desirable place to live and we do not foresee a significant decline in the rate of population increase in Puget's service area. In fact, new family formations from the existing school age children of Puget's service area alone assures the Company of the reasonableness of the load growth trends noted in the table.

3. Has the Company spent any money on research?

Through the Edison Electric Institute and individually, Puget Power has contributed to research of various alternative power generation methods, including development of the High Temperature Gas Cooled Reactor (HTGR).

Puget and other electric utilities, both public and investor-owned throughout the nation, and government agencies are planning to participate in a research and development program to be carried on by a newly formed research and development organization called Electric Power Research Institute (EPRI). This corporation was formed under the guidance of the Edison Electric Institute with broad support of both public and private organizations. The purpose of this corporation is to provide a technical staff and administration with facilities to embark upon a massive research and development program to invent, design, plan and test with pilot projects new or improved forms of producing, transmitting and distributing electric power and energy that will be feasible to meet environmental standards. The project will include research and development of improved technology and equipment in order to reduce the environmental impact of the generation of electricity by thermal power plants and to develop more efficient utilization of electric energy. The project also includes the construction of the first large-scale LMFBR demonstration plant. Funding of this organization and its research and development program will be by annual payments by all participating electric utilities and other organizations. Puget's total contribution to the LMFBR program is \$1,835,000, payable in ten equal annual installments commencing in 1972. Commencing in 1973, the contributions to the LMFBR program will be part of the total commitment to EPRI. It is anticipated that Puget's contribution to EPRI will be \$470,000 in 1973 and \$761,000 in 1974.

4. Programs for reduction of peak load.

Several years ago, Puget Power initiated a new program for voluntary peak reduction during certain hours on peak consumption days, generally in December and January. This program involves a number of industrial and commercial customers, as well as some schools. The response has been very encouraging. The peak reductions resulting from the program, combined with the curtailment of interruptible industrial and school loads, account for noticeable reduction in the peak hour demands.

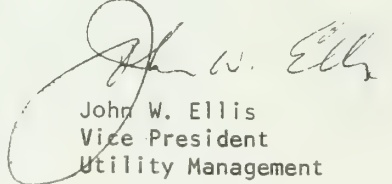
In addition, Puget has embarked on an extensive energy conservation program directed at the consuming public. This program is currently the principal objective of the Company's advertising program, with all of the communications media being used. As part of this program we have made available a booklet on energy conservation, a copy of which is enclosed. Puget has not implemented any load promotional type of advertising for a number of years. Puget Power application engineers assist customers in choosing facilities and rates to reduce their energy requirements.

5. Is the use of electricity "socially beneficial"?

It is difficult to imagine any use of electricity that is not "socially beneficial." Electric power lights our houses, streets, offices and factories; allows man to be more productive in his work and more relaxed and comfortable at home and at leisure. Electric power serves increasingly more medical and hospital purposes, powers pollution control equipment, and enhances the quality of life for all.

We hope the above will be sufficient to complete the environmental statement in acceptable form. If further information is desired, please let me know.

Very truly yours,



John W. Ellis  
Vice President  
Utility Management

Enclosures

# *The* MONTANA POWER COMPANY

GENERAL OFFICES  
ELECTRIC BUILDING  
BUTTE, MONTANA 59701  
March 5, 1973

Mr. Daniel Vichorek  
Technical Writer  
Department of Health  
Helena, MT 59601

RE: Your letters of February 16, 1973, and  
February 23, 1973 with questions concerning  
the environmental impact of The Montana  
Power Company's Colstrip development.

Dear Mr. Vichorek:

The following is in reply to the above subject.

1. Does The Montana Power Company intend to follow "The Plan for Colstrip" developed by Ken R. White Company?

Western Energy Company, a subsidiary of The Montana Power Company, intends to closely follow the "Plan for Colstrip" prepared by Ken R. White, Denver, Colorado, December 1972. (See attached copy of said plan, marked Exhibit No. 1, and Map 1A)

The plan will be reviewed and updated periodically to reflect alterations in existing development and new, presently unforeseen developments. The plan will be implemented by architect-engineers selected by Western Energy Company. The architect-engineers selected are: Drake-Gustafson, Architects; Christian, Spring, Sielbach and Associates, Engineers; and Wirth Associates, Landscape Architects. The three firms are located in Billings.

2. What does the Western Energy Company expect to do to accommodate the social, recreational, educational and other needs of the expanded population?

The social, recreational, educational and other needs are recognized and accommodated in the "Plan for Colstrip", which

will be implemented by Western Energy Company. Colstrip's community facilities include a school, fire and police protection services, churches, health care, library services, parks and recreational services. Some facilities and services, such as water, fire protection and parks are the primary responsibility of Western Energy Company; other facilities and services such as health care and library services are considered quasi-public in that Western Energy Company would be involved to the extent of providing sufficient space. Other needs of Colstrip can be adequately accommodated by existing public facilities, such as existing schools.

It is the intent of Western Energy Company to work closely with local, county and state groups to ensure an orderly, attractive development of the community of Colstrip.

There follows a more specific discussion of the services and facilities contemplated to accommodate the social, recreational, educational and other needs of Colstrip.

(a) Social Needs

Library services will be provided through a book-mobile from Miles City, Montana. (Page 28 - Ken R. White, Supra.) Two additional church sites are provided in the Plan. If new churches do not organize, the property can be converted into additional residential lots. (Page 27, Ken R. White, Supra.)

Western Energy Company intends to promote civic organizations which will contribute to a good social community environment.

(b) Educational

In relation to schools, Western Energy Company has reviewed with local school authorities the impact Colstrip development is expected to have on enrollment. School authorities then can take appropriate action for school expansion (Page 25, White, Supra.) Western Energy Company will contribute significantly to the tax base for the operation of schools.

(c) Recreational

The plan for parks and recreation includes further landscaping of existing parks, development and expansion of the proposed teen and community center and development of new play fields, tot lots and parks. (Pages 28-33, White, Supra.)

Several other recreational developments are recommended or planned outside the town, such as a golf

course, lake and picnic areas, rifle and pistol ranges, snowmobile and motor trails, wildlife and nature areas. (Pages 33, White, Supra.)

(d) Other Needs

Western Energy Company owns and maintains a number of single-family homes, apartments and a mobile home park. Detailed plans have been developed for expected growth and even growth beyond present growth expectations. (Pages 14-16, White, Supra.)

The architect-engineers hired by Western Energy Company will study the drainage and sewage needs of the area. Western Energy Company plans to provide for an increased water consumption. Western Energy Company has built a new 500,000 gallon water tank and will put in some new transmission pipes. Other existing utilities are deemed to be adequate for future requirements. (Pages 39-44, White, Supra.)

Commercial development is planned for the area. Provisions are made for a grocery store, drug and hardware store, general store, offices, medical facilities, a post office and space for such services as a laundromat, beauty shop, barber shop, service station, motel and restaurant are planned. (Pages 21-24, White, Supra.) Private enterprise should participate in the development of said facilities.

3. What are present and future costs of locating the plant at Colstrip compared with a site nearer load centers?

Comparative studies done by Montana Power Company based on total revenue required and levelized annual cost of expenditure indicate that it is slightly more economical to locate the plant at Colstrip than in other potential areas such as Springdale or Cushman.

There follows a partial summary of this study.

Two Units 1974-1985

	<u>Total Revenue Required</u>	<u>Percent Difference</u>	<u>Levelized An. Cost</u>	<u>Percent Difference</u>
Colstrip	\$ 279,189,000	Base	\$ 21,427,000	Base
Springdale	281,142,000	+ .52%	21,494,000	+ .32%
Cushman	281,989,000	+ .82%	21,626,000	+ .93%

Two Units 1974-2013

Colstrip	\$ 1,089,103,000	.10%	\$ 24,328,000	Base
Springdale	1,152,497,000	+6.05%	24,983,000	+3.20%
Cushman	1,129,406,000	+3.81%	24,849,000	+2.37%

Although the study showed the Colstrip site to be more economical the difference is less than 1%. Environmental and other considerations such as uncertainties in freight rates and freight performance for transportation of coal were the more persuasive reasons in the selection of Colstrip. (See our letter of February 12, 1973.)

4. Will the minerals in the drift precipitate out within 200 feet of the towers?

All minerals should precipitate out within 2,000 feet from the place of emission, and 60% of all minerals should precipitate out within 1,000 feet of the place of emission according to diffusion specialists of Bechtel Corporation.

Fog and ice formations should not develop beyond 200 feet from the cooling towers, according to cooling tower specialists of Bechtel Corporation. In reliance on Bechtel authorities, The Montana Power Company plans to construct its plant 200 feet in the direction of the prevailing winds from the cooling towers. The state highway is approximately 3,500 feet in the direction opposite the prevailing winds.

The Montana Power Company considers Bechtel Corporation to be a reliable authority on matters relating to cooling towers and mineral drift because Bechtel is one of the most experienced authorities in these areas. Bechtel Corporation is a worldwide Contractor which has constructed many different types of power plants.<sup>1</sup> (See also data submitted by Mr. Dan Berube at meeting in Helena on March 2, 1973)

5. How many cells will there be in the cooling towers, and what is the rated horsepower of the fans?

There are seven cells in the cooling towers and each of the seven fans has a rated horsepower of 185.2 according to the manufacturer.<sup>2</sup> (See also data submitted by Mr. Dan Berube at meeting in Helena on March 2, 1973)

6. Is any noise pollution from the Colstrip plant anticipated?

NO. There follows noise level specifications as set forth in the manufacturer's data sheet.<sup>3</sup> (See also data submitted by Mr. Dan Berube at meeting in Helena on March 2, 1973)

Noise Level (SPL - DB re 0.0002 Microbar at Ground Level 100 feet from Louvers at Center of Tower):

Octave Band		1	2	3	4	5	6	7	8	Weighted Freq. Band			
CPS:	From	20	75	150	300	600	1200	2400	4800				
	To	75	150	300	600	1200	2400	4800	9600	A	B	C	Flat
DB		84	83	82	78	74	72	68	64 (81)	NA	NA	NA	NA

7. What are the known operating characteristics of tangentially fired furnaces of the types hereininvolved and what is the measurement of nitrogen oxides in the stack gases of a unit hereininvolved?

The tangentially fired furnaces hereininvolved have the lowest nitrogen oxide production of any furnace.

It is also important to note that the performance of the type of furnace hereininvolved was adopted by the Federal Environmental Protection Agency as the standard under the Federal Clean Air Act. (See also data submitted by Mr. Dan Berube at meeting in Helena on March 2, 1973)

8. Has Montana Power Company done any research on the development of any other type of generating facility?

The Montana Power Company individually has not done any extensive research regarding other forms of generating facilities. However, The Montana Power Company is a member of, and supports the Edison Electric Institute,<sup>4</sup> which has done research on all forms of power generation.

9. Is there reason to think Montana's annual 5% increase in energy demand will not continue?

Montana's energy demand is expected to continue to increase at least at its present rate. This projection is based on and consistent with national projections, historical experience in Montana and particular known factors about Montana's future supply and demand.

Forecasters of the Federal Government and the electric industry expect the demand for electricity to continue to grow at an average rate of 7% a year with a doubling every 10 years.<sup>5</sup> Attached is a chart, marked Exhibit No. 2, from the 1970 National Power Survey of the Federal Power Commission showing past and future energy requirements in the west region of the United States. The peak demands by load centers from the same National Power Survey shows the demand on certain Montana supply areas to increase from 1,460 megawatts in 1970 to 2,590 megawatts in 1980.

Power supply area	Load Center	Peak demand--megawatts		
		1970	1980	1990
30	Butte-Anaconda	700	1,240	2,260
	Billings	175	312	563
	Helena-Great Falls	330	587	1,060
	Kalispell-Missoula	220	390	707
	Unassigned	35	61	110
TOTAL		1,460	2,590	4,700

Studies by The Montana Power Company, based on historical data, also indicate a significant increase in future demand for electric power in Montana. (See Attached Exhibit No. 3, "The Montana Power Company Annual Average Electric Energy Loads", Exhibit No. 4, "The Montana Power Company Annual Peak Loads", Exhibit No. 5, "The Montana Power Company Electric Load Peaks and Average" and Exhibit No. 6, "The Montana Power Company Electric Load Peaks and Average (Future)").

Furthermore, it is important to note that The Montana Power Company has had a deficiency in self-generated electric power in past years. Presently this deficiency is accommodated by purchases and exchanges with other utility sources.

For example in January 1973, The Montana Power Company's self-generated resources of electric power total 768 megawatts. The Montana Power Company received an additional 263 megawatts from other utility sources.<sup>6</sup>

By 1975 many of these other sources of power will no longer be available. By 1975 the peak load demand in Montana is projected to be 1098 (See Exhibit No. 4, *Supra*). Obviously Montana Power's present self-generated total of 768 megawatts would not be sufficient to meet the projected 75-76 peak load requirement of 1098 megawatts. This is why "brownouts" are anticipated by 1975. Although these projections of future energy loads of The Montana Power Company set forth in Exhibits No. 3 through No. 6 are based primarily on historical experience, and although power projections are subject to a number of variables, other known factors must be anticipated and taken into consideration. For example, U. S. Plywood and Champion paper of Missoula will need a significant increase in power for expanded activities in about 1974, and the Anaconda Company will need about 25 additional megawatts for its new Great Falls smelter by 1975.

10. If an increased number of television sets, water heaters and electric ranges have caused the energy demand to grow faster than the population since 1961, what indication is there that this growth rate will continue?

First, it is important to note that residential usage in which water heaters, televisions, etc. are included as a rather small part thereof, is itself only a smaller portion of electric power usage in Montana. For example in 1972 residential usage amounted to 20% of the total electric power usage from Montana Power Company.

Commercial and industrial usage accounts for 2/3 of Montana Power Company's electric usage.

Several signs of growth, such as population growth, rise in the living standard, rise in recreation and tourism and employment for Montana in the decade 1970-1980, are evidence of the continued growing need for electrical energy in Montana for both residential and industrial usage.

Secondly, in addition to the projection of more people and industry in Montana which will require more energy, the present market of electric energy is not exhausted. For example, only 75% of Montana's potential residential customers have electric ranges, only 60% have electric dryers, only 14% have outdoor lights and only 9% have air conditioning. The percentage of customer growth has been the highest in history in the past two years for Montana Power Company and is expected to continue.

11. Is there any specific information on how much power is now used and will be used by farmers, sewage plants and other environmental facilities?

The Montana Power Company's marketing personnel think farm and environmental usage has and will continue to expand. For example, the following is the annual added usage for irrigation purposes.

<u>Year</u>	<u>Horsepower Added</u>
1961	1380
1962	1333
1963	1622
1964	2163
1965	2042
1966	1643
1967	2767
1968	2582
1969	2081
1970	2743
1971	4643
1972	4292

It is projected that the amount of energy used for environmental improvement on a national basis will increase from about 2% of total energy consumption in 1970 to 4 or 5% in the period 1970-1985.<sup>8</sup> In Montana, sewage and water treatment facilities in Billings and Great Falls will each alone use enough electricity to serve an average Montana town with a population of 10,000.

Montana industry is also using an increasing amount of energy to improve air and water quality.

The Humble Oil Company in Billings has a water treatment system that returns their water effluent to the Yellowstone River in better condition than the water that comes into the plant. They use four 50 HP electric motors on large aerators in the ameliorating process. Great Western Sugar Company in Billings is constructing a new sewage treatment facility that will require 600 to 700 HP in electrical load. Furthermore, the air pollution equipment to be installed in the Colstrip plant will use approximately 25 megawatts of power, which is approximately 1/30 of the total electricity now generated by The Montana Power Company.

12. If so few Montana homes are electrically heated, why do the annual peak loads occur in the winter?

Montana Power Company's peak load occurs in winter because the temperature is colder and the days are shorter which results in greater uses of electricity. For example, with shorter days more lighting is required. With shorter days and colder weather there is a tendency for people to be indoors and use more electricity for lighting, clothes drying, hot water and heating. In addition, to electric heat, forced air and natural gas heating systems use electric thermostats, fans and blowers. Of course, residential

Mr. Vichorek  
Page 9  
March 5, 1973

use of electricity is only part of the power drain experienced during winter in Montana. Montana industrial and commercial customers also consume added energy loads in winter, because of colder temperatures and shorter days.

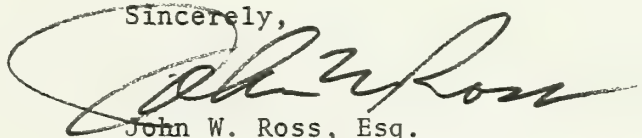
13. What workers are included in the Montana Power Company's projected payroll figures, and are these figures consistent with population projection of Ken R. White?

The Montana Power Company's payroll figures are based on payroll estimates for construction, operation and mining employees for particular months and years. (See Exhibit No. 7) Population projections by Ken R. White are also based on an estimate of the number of construction, operations and mining employees but additionally White's estimates are also based on professional and support personnel. (See White's "Population Projections", Supra, Exhibit No. 1, Page 10.)

Secondly Montana Power Company's payroll estimates and Ken R. White's population projection are in fact consistent. For example, The Montana Power Company's payroll estimates peak in early 1975. Similarly Ken R. White's population figures peak in 1975. (See Population Growth Table 2, White, Supra, Exhibit No. 1, Page 12, 13.)

I believe this completes the information requested in your letters of February 16, 1973, and February 23, 1973. If I can be of further assistance, please let me know.

Sincerely,

A handwritten signature in dark ink, appearing to read "John W. Ross", written over a horizontal line.

John W. Ross, Esq.  
The Montana Power Company

JWR:mcs  
Enclosures



#### FOOTNOTES

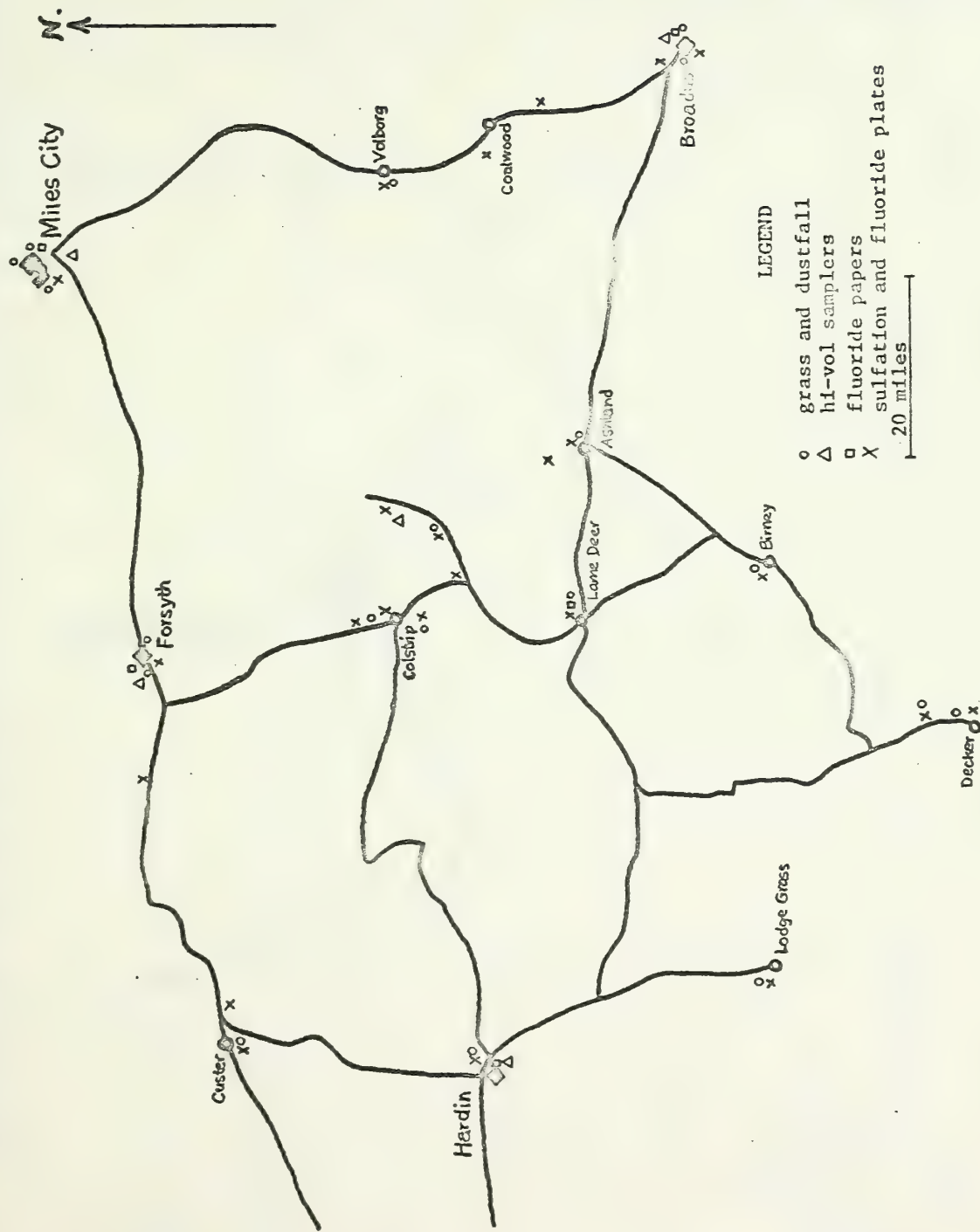
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## AIR SAMPLING NETWORK AND RESULTS

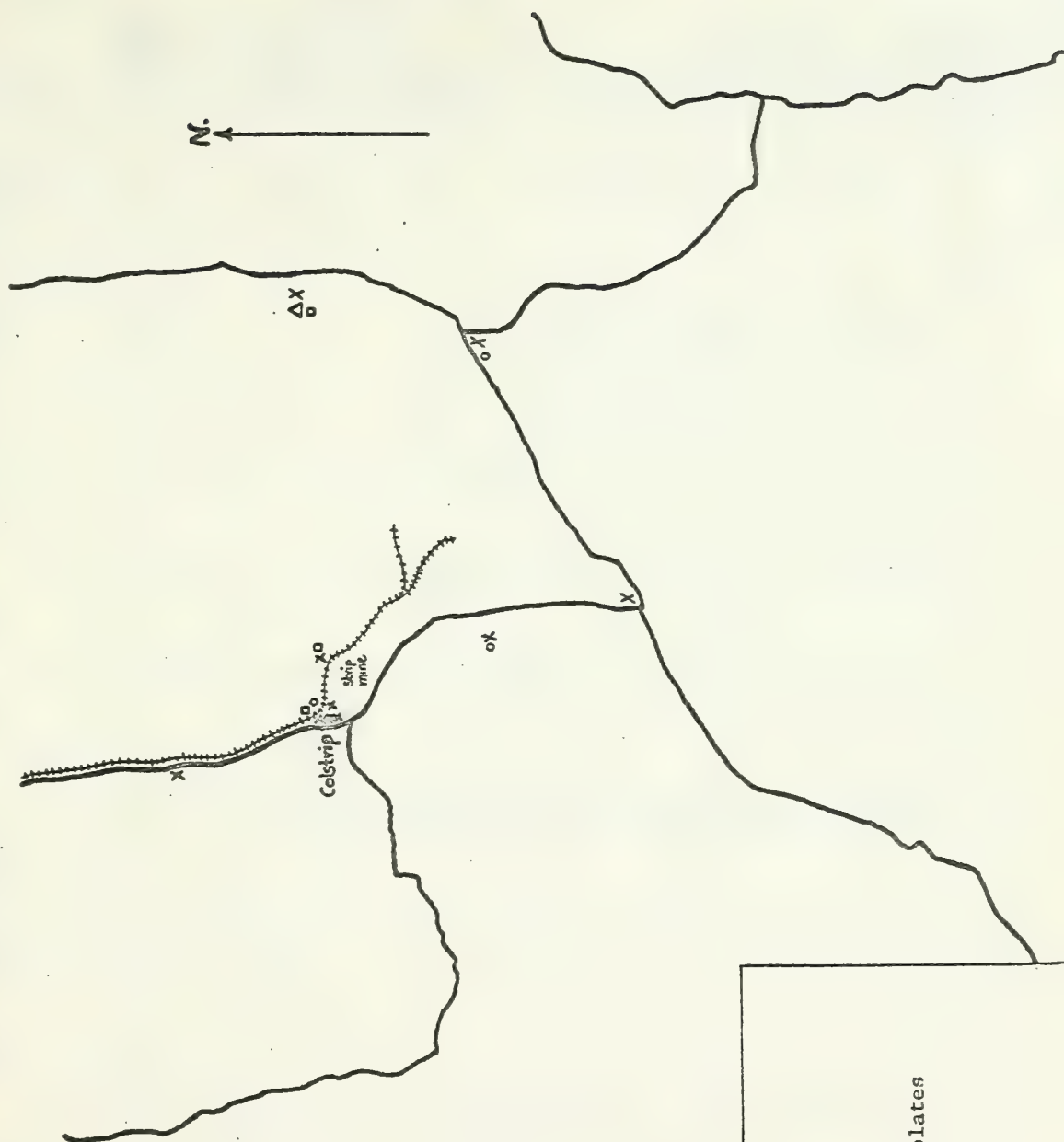


STATE DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES SOUTHEASTERN MONTANA AIR SAMPLING NETWORK





STATE DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES COLSTRIP AIR SAMPLING NETWORK



LEGEND

- o grass and dustfall
- △ hi-vol samplers
- fluoride papers
- X sulfation and fluoride plates

6 miles



## SAMPLING RESULTS

SAMPLING RESULTS																		HI-VOLS	
*(mgSO <sub>3</sub> /100cm <sup>2</sup> /day) .035 = ppm	SULFATION PLATES		F PLATES		F PAPERS		GRASS				DUSTFALLS				# Samples	Conc. # ug/s3			
	# Samples	Conc. PPM*	# Samples	Conc. # ug/cm <sup>2</sup> /30 days	# Samples	Conc. # ug/cm <sup>2</sup> /30 days	# Samples	Conc. PPM	Conc. PPM				# Samples	Conc. # ug/m <sup>2</sup> /mo.			Pounds per square miles/mo.		
									As	Pb	Cd	Zn					Cd	Zn	Pb
COLSTRIP																			
Approx. 5 miles N.	6	.0021	2	0.00															
Water Tower Pumphouse	7	.0045	3	0.05	5	.060	3	3.2	1	0.0	11.0	0.2	33.0	4	8.6	1	0	12.0	3.6
Western E. Office	8	.0049	4	0.00															
Warehouse	7	.0021	4	0.00															
Approx. 1 1/2 miles E.	5	.0014			5	.044													
Approx. 9 miles S.	8	.0014	4	0.00															
Kluyver Ranch (9 miles E.)	5	.0024	3	0.00	5	.011												23	22.0
Penbody E.	4	.0017	4	0.00			3	5.9	1	0.2	3.0	0.4	25.0	4	9.6	1	.22	16.0	5.2
Approx. 8 miles SE	4	.0024	4	0.00			3	2.7	1	1.1	6.0	0.3	19.0	3	28.6	1	.22	16.0	4.4
NO. OF COLSTRIP																			
Forsyth																			
West	5	.0045	4	0.00			3	2.2	1	1.9	20.0	0.6	58.0	4	17.0	1	.08	24.0	15.8
East	5	.0028	4	0.00			3	11.0	1	2.2	67.0	1.2	55.0	4	19.6	1	.26	24.0	13.2
Deport	4	.0028	2	0.00															
Greson Res.	5	.0028			5	.045												23	68.6
Interstate Marker 507	1	.0031																	
N.E. OF COLSTRIP																			
Miles City																			
Fish & Game	5	.0028	4	0.03			3	7.0	1	1.6	15.0	1.0	43.0	4	22.1	1	.22	58.0	12.2
East	5	.0031			4	.016	3	3.3	1	1.1	15.0	0.7	25.0	4	25.9	1	.36	48.0	20.0
Assay Res.	5	.0031	4	0.00			1	4.0						2	28.8				
Gravel Pit N.	4	.0024	3	0.00														70	71.3
EAST OF COLSTRIP																			
Volburg	5	.0021	4	0.00			3	2.9	1	0.6	11.0	0.5	26.0	4	7.2	1	.08	10.0	6.6
Coalwood	5	.0024	4	0.00															
Ash Creek	5	.0021																	
S.E. OF COLSTRIP																			
Broadus																			
East	4	.0035	4	0.06			3	7.9	1	1.4	9.0	0.3	27.0	4	43.1	1	.32	142.0	24.0
West	4	.0042	3	0.00			3	9.2	1	1.9	15.0	1.0	34.0	4	47.2	1	.22	26.0	9.6
LaPlamme Res.	4	.0028			3	.023												12	39.7
Sevage Lagoon	4	.0059	2	0.00															
U. S. Junction 312 & 212	5	.0024																	
Ashland																			
Power Substa.	4	.0024	4	0.03			3	5.2	1	0.3	7.0	0.7	17.0	3	12.0	1	.04	48.0	2.2
East	5	.0024	4	0.00															
St. Labrie Mission	4	.0024																	
North	5	.0028	4	0.03															
S. OF COLSTRIP																			
Lamo Deer																			
L.D.S. Church	4	.0017																	
North	5	.0028	3	0.03															
West	5	.0017	3	0.00															
East	3	.0017	2	0.00	5	.033	2	6.4	1	0.0	10.0	0.2	30.0	4	10.7	1	.22	22.0	7.8
Birney																			
Southwest	3	.0028	4	0.00															
Northeast	4	.0024	4	0.00			3	2.6	1	0.0	5.0	0.2	19.0	3	9.5	1	.02	10.0	4.2
Decker																			
Decker to Birney Rd.	3	.0014	3	0.05															
Coal Co.	4	.0024	4	0.00			3	3.5	1	0.3	7.0	0.3	25.0	3	24.4				
Post Office	4	.0035	3	0.00			3	3.2	1	0.0	5.0	0.5	28.0	2	19.6				
S.W. OF COLSTRIP																			
Lodge Grass																			
West	4	.0017	4	0.10															
East	4	.0017	4	0.00			3	10.7	1	0.0	13.0	0.7	35	2	26.1				
W. OF COLSTRIP																			
Hardin																			
West	4	.0038	4	0.08															
MDU Sta.	4	.0045			4	.038												18	38.4
East	4	.0038																	
Radio Tower	4	.0038	4	0.04			3	4.2	1	0.0	4.0	1.8	32	2	9.8				
N.W. OF COLSTRIP																			
Custer																			
West	4	.0056	4	0.04			3	3.5	1	0.0	16.0	0.7	34.0	4	8.6	1	.22	18.0	19.6
Prairie Bar & Cafe	5	.0045	4	0.03															



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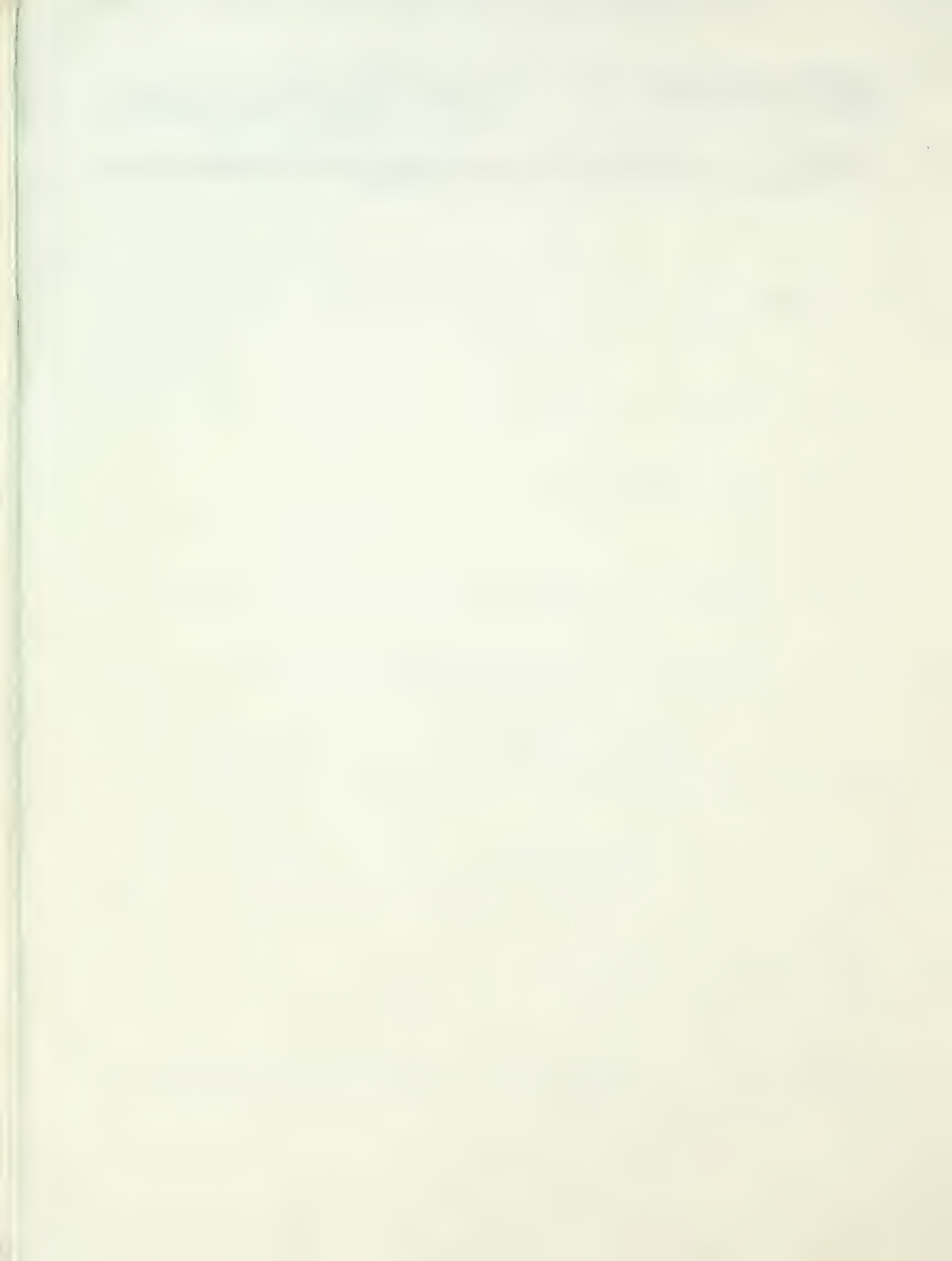
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